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THE BRICKBUILDER.

AN ILLUSTRATED MONTHLY DEVOTED TO THE ADVANCEMENT OF ARCHITECTURE IN MATERIALS OF CLAY.

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COPYRIGHT IN ARCHITECTURAL DESIGN.

WE have been much interested in an editorial which appeared some time since in the *British Architect* under the above heading. It involves a question which sometimes comes very close to the heart of an architect, especially when after long and persistent study he has evolved a successful design only to have it reproduced by some inferior architect, who seizes upon his good ideas and tries to transplant them bodily. As the publishers of a journal which presents to the public the best work which is produced, we feel an interest in the subject, as the drawings which we offer are manifestly intended to be in certain directions of immediate and available help to architects who see our pages. It would seem at first thought as if by publishing a good design an architect were voluntarily surrendering his rights; for while every architectural publication as a whole is copyrighted, it is pretty hard to protect all the features of a design so that an unscrupulous person might not help himself thereto. There is, however, another, and we are inclined to believe a fairer, way of looking at it. In the first place we have yet to know of a single instance wherein the same design can be used for more than one piece of work. The conditions are always varying, and even though an architect deliberately starts out to copy a design, it is very seldom that he is able to do so, and he will almost invariably find that he has evolved a new design, and that comparatively few features of the original have been retained. Also, we have noticed that the architects and designers who are most fearful of having their designs copied, who would be most prone to seek protection in a copyright, are the ones whose designs really have the least merit, and generally for no other reason than that they have been obliged to labor so hard over their evolutions they are most desirous of building a fence around them, while the leaders in the profession, the men whose work we should all be glad to emulate, are seldom troubled with any apprehension of piracy. As the *British Architect* very truly states, the general run of architectural design has hardly enough original merit to make it worthy of copying, and in the case of architects whose work is sufficiently individual and characteristic to render it liable of being copied, it is a question whether the architect so plundered is greatly injured. We feel that the broader spirit is the better one, that there are enough ideas in this world to go around and to spare, that a certain amount of architectural expression is common property, and that all of us, beginners and masters alike, gain by the freest interchange of ideas. We grow from without quite as much as from within, and a copyright or any restriction placed on the free exchange of thought among the members of our profession would operate both ways by restricting the borrower and the lender. There probably never has been a man in this country who made a more liberal use of his books than the late H. H. Richardson, but he was a most royal borrower, and from whatever source his inspirations may have started they ended by being thoroughly and truly his own. We do not believe that many of our successful architects would ever care to do the same thing twice, or to solve the same problem in design twice in exactly the same way, and our experience has been that those whose designs we most honor are most ready to have them placed where they will benefit their weaker brethren to the greatest extent. A copyright in architectural design is perfectly practicable, but it would do more harm than good: it would narrow the spirit of the profession which is so free and generous at present in this country, and, moreover, there would be but slight necessity for it.

This brings to mind one feature to which we have frequently alluded in these columns which ought to be a settled custom with architects in good practise, namely, to have every one of their buildings signed in just the manner that a painter would sign his pictures. If the architect feels his name is going to be cut on the building before all who want to see it, he will be much more careful what sort of creation he puts up, and less prone to try to excuse a bad design by vague reference to the limitations of the owner or the builder.

THE intelligent observer, if candid and able to dissociate sentiment and patriotism from clear, unprejudiced thinking, cannot but admit that the painted wooden architecture of our suburban and country towns falls far short of entirely satisfying. Not that our shingle and clapboard houses are not comfortable and warm; not that they do not meet the conditions of good living; not that they are not frequently good to look at. All this must be granted; but that they do lack that great essential quality of good architecture, — namely, substantialness, permanence, — is undeniable. Born as we are to the heritage of our wooden vernacular, we are prone to think it good and all-sufficient, and we naturally resent criticism of it; but as our view broadens, as we know other countries better, we come to realize that our chauvinistic tenacity to

this national custom is blind and illogical, and not commensurate with our advance in other lines among the nations of the world. It is too much to expect, however, that this state of things can change all at once. Wooden architecture must for a long time — possibly always — be somewhat cheaper than any other, even if the present heedless slaughter of our forest trees be not checked, and a man of moderate means must either build a wooden house or no house at all. But architects have before them a wide field of missionary work in inducing their well-to-do clients to build in something more enduring than wood. Perhaps it is not to be deplored that the greater part of the building of the last few generations is destined to early decay. Peace to its ashes! Our many wisely conducted schools of architecture, and intelligent study and travel have now bred us a class of architects who are ready and able to change all this, and upon them depends the character of the work of the coming century. Brick and stone have always been, and always will be, the vehicles of the highest architectural expression of advanced civilization, as they are likewise the most indelible record of architectural progress. It is the especial province of THE BRICKBUILDER to stimulate the use of brick and burnt clay products. It entered the field of professional journalism for this express purpose, and it is gratifying to us to see already a sure awakening of architectural sense and conscience, and to know we are in the company of the wisest and ablest architects. From our intimate touch with them we know that amongst their clients there still exists much prejudice against the use of brick. The taste for inch boards, clapboards, and paint dies hard, but it is surely waning. Not the least of the many virtues of brick is that, in substituting it for wood, much of the *prettiness* of our house architecture will become impossible, and the *real* beauty and picturesqueness of simplicity, reason, and permanence will perforce take the place now held by the ornate, the queer, and the ephemeral.

NO argument is needed to establish the truth of the proposition that color-hunger is congenital in the human species, and that color-sense is one of the earliest that strives for gratification in all races. Man has never been satisfied with a shelter which simply kept out wet, wind, cold, and heat. As soon as these functions were subserved he has felt the need of graceful form and pleasing color. In the matter of color, vegetable and mineral stains were obviously the first to be used, being ready to hand. But these do not stay fixed after exposure to the weather; like modern pigments, they all fade, more or less. In fact, few natural products can withstand the bleaching effect of sunlight or the disintegrating processes of dampness, frost, and heat. The tendency of all exterior painting is to lose its original color, and degenerate into a dull, lifeless, dusty, neutral drab. Any street of new, painted wooden houses will show this in a few years, however varied they may have been at first. When this stage is reached the house owner repeats the process of painting, and with characteristic national unrest he generally tries a new color or combination of colors, — and in a few years more, *da capo*. Now, if there is anything in our domestic architecture more distressing than a neglected wooden house, gone shabby, it is its smart neighbor in a fresh garb of spring paint upon which you cannot look without blinking; but it must be confessed that there is still a preponderant liking for this brand-newness in the community. Compare such a house with one of the simple brick houses of last century, of which there are many examples in our seaboard States, North and South. This latter is still in vigorous health, is growing each year to be more and more an integral part of its environment. It has adjusted itself to its surroundings; it belongs there; it has grown soft and mellow, not faded, with years; with decent care it is always clean, not shabby; and it civilizes. Its little woodwork — window frames, etc. — must be painted, of course, for protection, but there is no periodical ruthless tearing down of vines in order to slap its walls with the paint brush.

We believe that the wood and paint day has passed its meridian and that the twentieth century will see substantial progress towards a wider use of the most imperishable of all known building materials, brick and the allied burnt clay products. Never have they been so many and so varied as now. All possibilities of form, color, and texture are here, and the material that comes out of the kiln is practically everlasting. Born of fire, fire cannot harm it, and time and the elements make but small impression on it, unless indeed it be to beautify it.

PERSONAL, CLUB, AND SUNDRY NEWS ITEMS.

ELMER GERBER, architect, has opened an office in the Reibold Building, Dayton, Ohio.

ALDEN & HARLOW, architects, announce the removal of their offices on April 1, to 314 Fourth Avenue, opposite the Vandergrift Building, Pittsburgh, Pa.

J. H. CONSIDINE AND ORNAN WALTZ, architects, of Elmira, N. Y., have formed a partnership, under the firm name of Considine & Waltz, and will continue in the same offices, 323 Carroll Street, Mechanics Building.

H. E. WEEKS, formerly chief draughtsman with H. Neill Wilson, architect, Pittsfield, Mass., has been admitted to the firm, the new style of which is Wilson & Weeks; offices in Savings Bank Building.

THE annual meeting of the St. Louis Architectural Club was held on the evening of April 4, at which the following officers were elected: President, R. M. Milligan; first vice-president, F. A. Seifert; second vice-president, Ernst Helfeusteller; secretary, F. A. P. Burford; treasurer, John C. Stephens; advisory members of executive board, William B. Ittner and Charles Pfeil.

IN accordance with his instructions at the regular monthly meeting in March, when the new T Square Club Fellowship was announced, Mr. Seeler, president of the club, has appointed Walter Cope, Prof. Warren P. Laird, and Albert Kelsey a committee to formulate a program and prepare a code of rules to govern this competition. It is further stated that these will be cast in a new field, so as to include an indigenous sociological problem for architectural treatment.

AT a recently held meeting of the Washington Architectural Club the following resolutions were adopted: —

To the Architects and Laymen of the United States: —

We, the members of the Washington Architectural Club, a representative body of architects of the District of Columbia, in meeting assembled, believing that,

While it is true that for a long time in the history of the office, known as that of the Supervising Architect of the Treasury, there existed a state of affairs which deserved the adverse criticism of the profession at large, those conditions have now been so altered for the better that adverse criticisms are unjustifiable and detrimental to the best interests of the profession, do hereby

Resolve, That this club extend to the Supervising Architect and his staff its moral support, and desires to uphold them in their earnest efforts to improve governmental architecture; and

Resolved, That this club resents the unjust and sweeping charges of incompetency and mismanagement which have recently been made in the legislative halls of the national Congress, and it is hereby further

Resolved, That this club believes it unjust to hold the present Supervising Architect responsible for work executed under the direct supervision of his predecessors in office.

EDWARD W. DONN, JR.,
President.
ARTHUR B. HEATON,
Secretary.

The American Schoolhouse. XVII.

BY EDMUND M. WHEELWRIGHT.

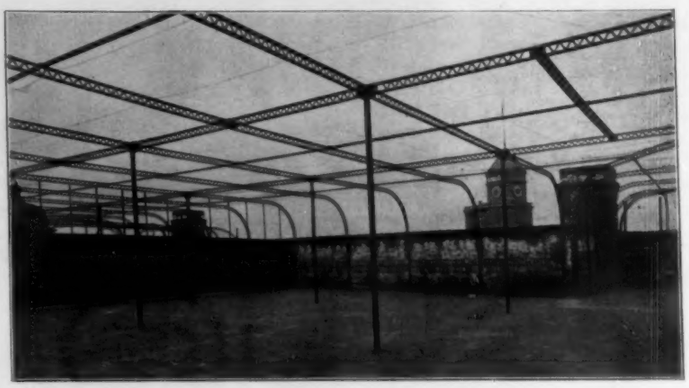
(*Concluded.*)

THE work done by Mr. Snyder in the designing and construction of schoolhouses for our largest and most cosmopolitan city, work which is typically illustrative of the part our people are playing worthily in the civilization of our time, is most interesting and instructive.

The merit which this work has as a whole may make any criticism of it appear somewhat hypercritical, but in the treatment of a subject where the object is to collect and compare examples of schoolhouses that by such comparison the several types may be improved, some criticism of the buildings under consideration cannot well be avoided, and the writer believes that he should state his own preference for certain features of school buildings and his reasons for such preference when he finds such differences of opinion.

Mr. Snyder gives preference to mullioned windows instead of evenly spaced windows distributed in the class-room walls.

Except where the mullioned windows practically fill the whole wall whence the light is derived, the writer is of the opinion that the rooms would be better lighted if the windows were evenly distributed in the wall. He also maintains that for reasons previously given transom bars should be excluded from class-room windows, and that no architectural "style" should be chosen in the treatment which would make such a feature necessary. This opinion is not simply a dogmatic assertion; it is made with the conviction that a satisfactory expression can be given to a schoolhouse where even such minor considerations of utility are accepted as a governing condition. It is by the regard for such considerations that some approach can be made to what is being sought by some as an "indigenous" architecture, but which others look upon simply as architectural expression of practical needs carefully considered and freed from traditional forms foreign to the best requirements of a given building.



ROOF PLAYGROUND, PUBLIC SCHOOL NO. 147, NEW YORK CITY.
C. B. J. Snyder, Architect.

PUBLIC SCHOOL NO. 154, NEW YORK CITY.
C. B. J. Snyder, Architect.

As to the methods of disposal of outside clothing adopted in these New York schools, the writer recognizes the stern financial necessity that the problem of popular education in New York presents; but he must assert his opinion that even when provided with special ventilation, as in these cases, that the separate "wardrobe" enclosure with outer light is far preferable to any method of outdoor clothing disposal immediately adjoining the corridors which is unprovided with outside light and is not permanently a separate enclosure. The writer again expresses the opinion that economy of space in high schools can be gained, and indirectly a desirable freedom be given such pupils, if individual clothing lockers in large rooms in the basement are provided instead of "wardrobes" on the several stories. It may be a small matter, but the former method appears to the writer indicative of a system in which due respect is shown the individual, and that it is best to treat the high school scholar more as an individual than appears to be possible to be done in the case of pupils of the lower grades.

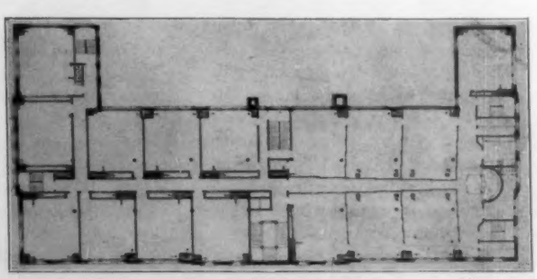
The later H plans adopted for these New York schools certainly present, under the conditions which Mr. Snyder describes, a better method of schoolhouse lighting than is shown in plans like that of public school No. 154.

The larger amount of wall surface shown in the first floor of this latter school is justified because this floor is not used for class rooms but for indoor play rooms. The writer believes that if the system of evenly spaced instead of mullioned windows had been here adopted, the design would have not given such broad wall surface in the central pavilions, and the class rooms placed in this section of the building would have been more satisfactorily lighted.

It is to be noted that the Girls' High School presents the features of large study rooms which have been commended in these articles as differentiating the high from the grammar school type.

It would appear better to have adopted a somewhat more expensive method of framing than that evidently used in schoolhouse No. 154, so that the columns which obstruct in a measure the floors of the class rooms of this building would have been covered in the partitions.

The introduction of the roof playground in New York schools is a most interesting innovation and one of practical economy where



FOURTH STORY PLAN, PUBLIC SCHOOL NO. 154, NEW YORK CITY.

schoolhouses are built upon costly sites. In these New York schools the first floor is generally used for covered playgrounds analogous to like features usual in English schoolhouses. This arrangement appears to entail a needlessly extravagant use of space, for with windows of proper height the basement play rooms serve the same purpose without danger to the health of the pupils.

PLAYGROUND, FIRST FLOOR, PUBLIC SCHOOL NO. 154, NEW YORK CITY.
C. B. J. Snyder, Architect.

Some of the German schoolhouses are placed in pleasant park-like grounds, but as a rule the gymnasiums afford the principal recreation space for the pupils, and there the pupils are under as rigid discipline as they are in the class rooms.

The French appear to attempt to a greater degree to give the playgrounds features which cultivate the sense of beauty. The playgrounds are usually enclosed by brick walls on which trees are trained, which, when in leaf, mass the whole wall in green, and further well-restrained landscape gardening effects are made.

There remains yet much to be improved in American schools as regards arrangements for recreation and physical training as well as bathing facilities and in the more decorative treatment of schoolhouse grounds.

In closing these articles the writer presents his general conclusions on the most important consideration in schoolhouse construction, namely, the lighting and air capacity of class rooms.

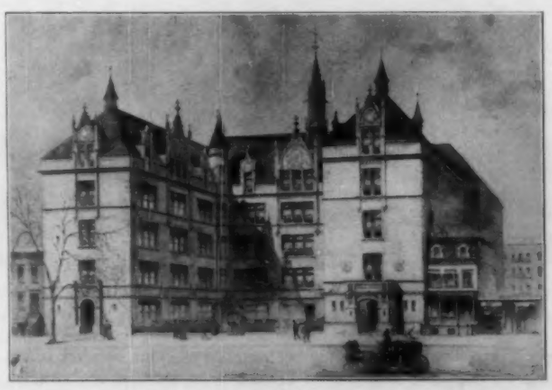
Class rooms of Europe and in the United States are usually 32 ft. in length. A greater length makes it difficult for the teacher's voice to reach, without strain, the pupils in the last row of seats, and at a greater distance the pupils' work on the blackboards at the end of the room cannot be readily seen from the platform. On the Continent, as in Germany, for instance, the same length is generally adopted, although 30 ft. is that preferred by most of the European authorities in schoolhouse construction. In the German schools analogous to those of grammar grades, in the United States, the class rooms are generally 32 ft. long, 22 ft. wide, and 13 ft. high, and accommodate, upon forms seating four each, fifty-six pupils, giving a floor area of 12½ sq. ft., and an air enclosure of 163 cu. ft. for each pupil. In the schools more recently built in Prussia, as in the Gemindeschule No. 204 of Berlin, which has recently been seen by the writer, although there are rooms of greater capacity, because of greater length most of the class rooms are approximately 32 ft. long, 20 ft. wide, 13 ft. high, and accommodate forty-six pupils, giving a floor area of 14 sq. ft., and an air enclosure of 182 cu. ft. for each pupil.

The grammar class rooms in the schoolhouses built within recent years in Boston, and in many other cities of the United States, are 32 ft. long, 28 ft. wide, 13½ ft. high, accommodating fifty-six pupils, seated at single desks, giving a floor area of 16 sq. ft., and an air enclosure of 216 cu. ft. for each pupil.

While the areas above noted are much in excess of those found in the latest and best Prussian schools, they fall far short of those advised by Dr. Risley, the most recent medical writer upon this subject. Dr. Risley advises a schoolroom 32 ft. long, 24 ft. wide, 15 ft. high to accommodate forty-five grammar school pupils, seated at single desks, giving a floor area of 19 sq. ft., and an air enclosure of 250 cu. ft. for each pupil.

The seating of the pupils of American schools at individual desks, which elsewhere only maintains in Switzerland, and there, the writer believes, but in the upper grades, is not likely to be discarded in America. In the best practise the minimum floor area and the minimum cubical area of air for each pupil, 16 sq. ft. and 216 cu. ft. respectively, should be accepted, and with these factors determined, the question of the satisfactory lighting of the class rooms remains the principal consideration.

The code of rules established by the French government for the construction of schoolhouses fixes the minimum allowed height of a class room at 13 ft., and where the light comes from one side only, requires that the minimum height of the room shall be two thirds of its width measured from the inner wall to the face of the outer wall of the building. In a brick schoolhouse fitted with double sash, a class room lighted from one side only, 32 ft. long, 28 ft. wide, accommodating fifty-six grammar school pupils, would require a height of 19 ft.; a room of the same length, 24½ ft. wide, would accommodate forty-eight pupils, and would require a height of 17 ft.; a room of the same length, 21 ft. wide, would accommodate forty pupils, and would require a height of 14 ft. It will be seen that this French rule requires a greater height of ceiling than that recommended by Dr. Risley, *i. e.* 15 ft. in height for a room 32 ft. long, 24 ft. wide, accommodating forty-five pupils. It is probable that in the clear atmosphere of the United States, a room would have on the average, throughout the year, much better lighting than would a room of like dimensions in any part of the north of the Continent or in England. Even rooms 28 ft. wide are fairly well lighted by the

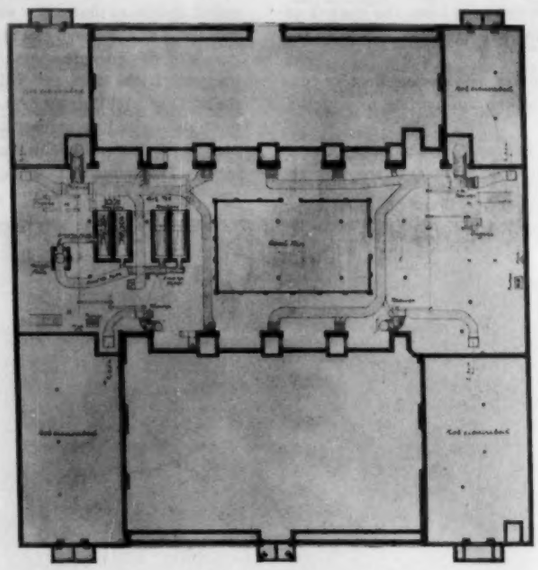


PUBLIC SCHOOL NO. 159, NEW YORK CITY.
C. B. J. Snyder, Architect.

four windows on one side of a room but 13½ ft. high. It is probable, therefore, that if the class rooms in American grammar schoolhouses were given a width of 24½ ft., they would be well lighted if given a height of 13½ ft. The disadvantages of height are obvious, providing of course that adequate lighting can be given by other means; but it is possible that the stud of 14 ft. 3 ins., adopted in the more recently built schools in the city of New York, may be that finally adopted in the grammar schools of the United States, especially in those of several stories in height. With this ceiling height economy of space can be gained by placing two tiers of toilet rooms in the height of a full story. In

the United States, with ceiling height noted above, class rooms with windows on one side only and 28 ft. wide would probably be found not to be ill lighted; but American architects should not be content with the lighting which can be given a room, lighted from one side only, 28 ft. wide, with 13½ ft. of ceiling height, which are the customary dimensions given grammar grade class rooms in the United States.

The dimensions given the best American class rooms for the grammar grade assure ample light only for the corner rooms, where, disregarding theoretical requirements, a good diffusion of light can be gained by taking it from the backs as well as from the left-hand side of the pupils. The inside rooms, even in most of the best designed schoolrooms of the United States, are planned to accommodate the same number of pupils as the corner rooms, under conditions of lighting which are approved by no authority on the subject. Dr. Cohn says, "There never can be too much light in a schoolroom," and he has, in this opinion, the support of all who have given practical consideration to the lighting of schoolhouses.



PLAN OF CELLAR, PUBLIC SCHOOL NO. 165, NEW YORK CITY.

In writing exercises it is advantageous to have the major part, if not all, of the light from one side only, and that on the left of the pupil, but otherwise the quantity of the light, and not the direction whence the light comes, is the most important consideration. It is, therefore, better with corner class rooms 28 ft. wide to have four windows in the long wall and at least two, if not three, in the other outside wall. A window directly opposite the teacher's desk is objectionable, for the preservation of a teacher's eyesight is no unimportant consideration. A constant glare of light directly in one's eyes is certainly not desirable, and hence, as is often done in France and sometimes in the United States, it appears desirable that the portion of the wall directly opposite the teacher's desk should be blank, and that the windows on either side of this space should be placed as near the corners of the room as the construction makes possible, or as may be advisable for the external appearance of the building.

In the schools of the Continent, the class rooms are seldom more than 22 ft. wide, and the regulations generally provide the lighting of class rooms from one side only, but this regulation is in the majority of cases respected.

PUBLIC SCHOOL NO. 166, NEW YORK CITY.
C. B. J. Snyder, Architect.

From the foregoing it would appear that as far as the lighting of the corner rooms of American schoolhouses are concerned, they might retain their present large dimensions, but that, in rooms lighted from one side only, if their height is not increased to 14 or 15 ft., should have in the rooms not more than 24 ft. of width, and in such rooms forty-eight instead of fifty-six pupils should be accommodated.

Class rooms in primary schools, if given a ceiling height of 13 ft., should be 32 ft. long by 22 ft. wide, and thus furnish accommodations for fifty-four instead of fifty-six pupils.

In Germany light from the north is permitted at the backs of the pupils; in France additional lighting through the wall opposite that through which the main light comes is required; while certain Swiss authorities condemn, and the regulations of certain Swiss cantons forbid, lighting from two opposite sides. The common sense view of the lighting question appears to be that all possible light should be gained for a class room, providing that if from a side of the building exposed to the sun the major part comes from the left-hand side of the pupils, that none comes in their faces, and that when on a side of the building exposed to the sun there should be no window directly opposite the teacher's desk.

The conditions seldom exist which permit the construction of a schoolhouse with the orientation which its designer would give it if there were no other governing conditions. There is by no means an unanimous opinion in regard to the best method of placing such buildings in regard to exposure to the sun. Most authorities agree that the eastern exposure is that most desirable for class rooms; but others whose opinions are also authoritative maintain that the northern light is preferable for these rooms, providing the windows are furnished with double sash and that the rooms are thoroughly warmed and ventilated. Probably most would agree that the greater advantages would be gained in a building whose main façade had a southeastern exposure, by which the sun can shine on three faces of the building for the greater part of the year. There is a substantial agreement that, on the whole, a westerly is less desirable than a northerly exposure, providing the building is well heated and ventilated. The question of the relative merits of the northerly and southerly exposure for class rooms may be left to be decided, as the advantages of a steady, clear northern light and that of the healthful and cheerful light from the south may be given the greater importance.

The Formal Garden. I.

BY ELMER E. GARNSEY.

THE scope of architectural design embraces much more than the planning and construction of buildings. The modern architect who has schemed out the general arrangement of floor space and communication, of plan and façade, has only begun his work; while, too often, his province is considered to be limited to the design of the actual structure, and he is debarred from the control of both interior and exterior matters, which are important factors in the artistic sum total of his labors.

Of these, the most important, so far as exterior effect is concerned, is the proper consideration of the approaches to and the grounds about the building.

That the varying conditions of site and surroundings exert a strong influence upon architecture needs no argument; and that an architectural design should in some degree include its surroundings is equally logical.

A building, unlike a ship, does not change its anchorage; it is a stationary structure, and if it is properly designed in relation to its environment and the design of that environment is in harmony with the building itself, there will be no suggestion of the possibility of its removal to another and equally appropriate site.

Too many buildings appear either to have been casually dropped on the ground or to have been towed in and temporarily anchored in the position they occupy. That design, therefore, is not complete which does not take into consideration the approaches to the building and the character and detail of the grounds in which it stands. The architect is not always at fault, even in this matter; for the client, either singular or collective, too often knows exactly what is most desirable, and is too seldom restrained from "laying out" the grounds in close proximity to the building,—either leaving the matter to the engineer, who is a man of curves and grades, to the gardener, whose laudable ambition is to make a great many blades of grass grow where none are desired and to cause the earth and every portion thereof to put on foliage and flower, or else the client, grown exceedingly wise in his generation, leaves nature to design the surroundings. As if nature was to be depended on to curb herself into harmony with man's handiwork!

IN THE GARDEN OF THE VILLA MEDICI, ROME.

Nature does her own work, and usually does it much better than man does his; and it is just because she is inimitable in her own way that man's art, architectural or otherwise, suffers by contrast. Nature is free and unconfined, while architecture at its best is the result of careful and painstaking study of rules and traditions, of proportion and symmetry; and when the freedom of the one is brought into immediate contrast with the studied forms of the other, incongruity rather than harmony is achieved.

It is necessary, then, that the architectural plan should include the laying out of the grounds about the building, that the axis of the one should be the axis of the other, that the proportion of building to grounds should be carefully considered, and that the details of each should be harmonious. These are basic principles and perhaps trite enough; but we need to be reminded of basic principles occasionally, "lest we forget."

The architect and not the gardener should design the grounds; the office of the latter being to execute the work of planting and pruning in accordance with the specifications of the other, just as the builder constructs the house from the architect's drawings and specifications; while the gardener's taste in design is no more to be relied upon than that of the mason or carpenter, to say nothing of the painter. The problem is not one of gardening or floriculture, but purely of design; not one of raising flowers or fruits, but of esthetics; and if the taste and judgment of the architect, in prescribing the style of architecture best adapted to a certain site, is conceded to be sufficient, how much more should he be consulted in the completion of that design, by the planning of its immediate surroundings! The value of these approaches and accessories can hardly be over-estimated, and few of the great monuments of architecture in the world owe nothing to their assistance.

The avenues of obelisks and sphinxes leading to an Egyptian temple convey an impression of distance and majesty unattainable without their long perspectives. St. Peter's, at Rome, robbed of its superb approach of elliptical colonnade, fountains, and terraced platforms, would lose much in dignity and impressiveness.

St. Mark's, in Venice, belongs to the piazza in which it stands, whose pavement is part of the ground plan on which it is built; and if this appreciation of plan be carried to its logical conclusion, we shall find Paris itself a great city built on an architectural or formal plan, studied in relation to the monuments which mark its axes and accent its vanishing perspectives.

It is probably too late to attempt the planning anew of our American cities, when the widening of a single New York street for a mile costs millions of dollars; but it is not too late to consider the individual building and its environment, nor to recommend the study of the subject to those who are, or shall be, responsible for the beauty or ugliness of our public and private buildings.

The architectural problem in our great cities is almost invariably limited to the area covered by the actual structure, and only in the case of public buildings has the town architect any opportunity to show his skill in bringing the edifice into harmony with its surroundings. He may exemplify some appreciation of the matter by the slight platform on which his building stands, for even this will effect a gradation between structure and street; while if he is so fortunate as to have a few extra feet of area, this platform may be emphasized by columns, balustrades, or vases, thus echoing his vertical or horizontal lines, and adding the touch of beauty, it may be, to a utilitarian structure. But it is when architecture is really juxtaposed with the nature of woods and fields that the need is felt for something more than simply "building up." We must "build out" as well; and when some suggestion of this sort is apparent, we shall find we are really

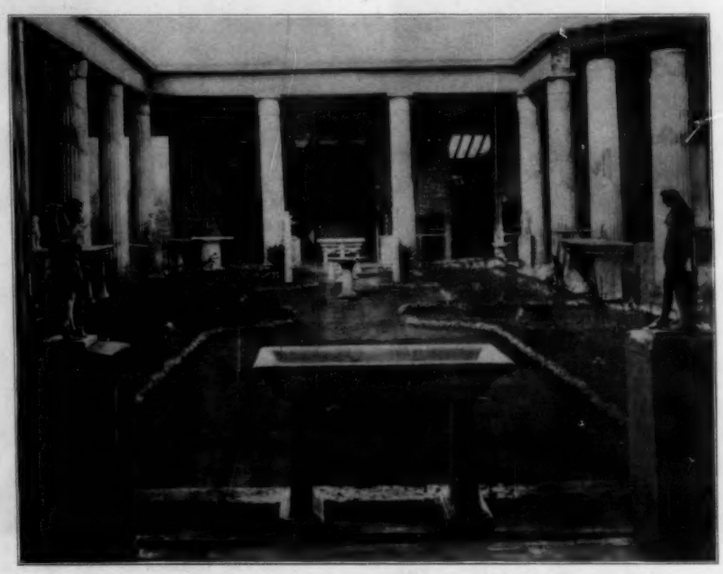
building in harmony with nature, neither affronting her on the one hand, nor vainly striving to imitate her on the other.

There must ever be a sense of the inharmonious in stepping from the threshold into a quasi-wilderness; yet certain modern notions of landscape gardening seem to have for their objective the reproduction of natural growth and tangle, by the avoidance of straight lines in walks and planting, and the transparent and abortive attempts at the imitation of nature's subtle carelessness in lawn and garden.

It is pleasant to feel that we are not entirely at the mercy of nature as soon as we step from our habitation; that we have subjugated her in some degree, and that the dwelling place is somewhat extended beyond the actual walls of the domicil.

The porch or loggia, roofed and partially enclosed, should lead to the terrace, where, although the roof is no longer interposed between ourselves and the sky, a sense of protection is still maintained by the wall or balustrade, and the pavement protects us from direct contact with the soil. If possible, the terrace should be placed on that side of the house from which may be obtained the best view of the landscape; and if it is bounded by a balustrade or wall, this strong horizontal base line will be of great value to the picture.

Indeed, no landscape is seen at it sbest without some architectural line as a basis of the composition; for proof of this we have only to observe the great paintings of the past, where we shall find that the masters appreciated the principle, exemplifying it in their works; while for the reality one may look across the Roman Campagna from the terraces of the Villa d'Este at Tivoli; over Rome itself from the Pincian Hill; at Fiesole from the Piazza Michelangelo above Florence, or on Washington from the terraces of the Capitol.



THE ATRIUM IN THE CASA DEI VETTI, POMPEI.

An attempt at the restoration of the garden has been made here, and the statuettes, fountains, tables, etc., have been erected as nearly as possible in their original positions.

The treatment of the terrace must depend largely on local conditions; and in the best examples of the past may be found the most valuable object lessons. It may be a simple walk, paved, graveled, or turfed, its dimensions in scale with the house. Its reason for being is no less practical than esthetic, as it raises the ground about the house and carries water away from the foundation walls, as well as providing the structure with a base commensurate with its mass.

From the terrace we should descend into the garden; which, properly speaking, is an enclosed space of ground, separated from the outside world by a wall or hedge. It belongs to the house rather than to nature, and not until its boundaries have been passed should the restraint and conventionality of man's design and handiwork give place to the freedom and exuberance of nature's growth.

The question of design in the garden is of the utmost importance. What kind of a garden is it to be? An English author says, "People with a feeling for design and order will prefer the formal garden, while the landscape system, as it requires no knowledge of design, appeals to the average person who 'knows what he likes,' if he does not know anything else." (How seldom it is that those who "know what they like" appreciate really good art!)

The formal garden, then, appeals to those who appreciate order and design; in other words, those who are not insensible to the beauties of classic architecture; and the Italian villa, house and grounds considered together in one plan, that a classic plan, is the prototype from which all excellent formal gardening has been derived since the early Renaissance period, and to which the architect and amateur must look for the best knowledge and tradition now attainable.

Formal gardens and villas were not invented in the Renaissance, for the Romans had appreciated the charm of out-of-door life to the utmost, and had built extensive and elaborate pleasure palaces in southern Italy, while the country about Rome was once a vast garden, composed of the villas of nobles and wealthy citizens. Pliny's description of his own villas and the ruins of that of Hadrian are evidences of the enormous labor and expenditure of the Imperial age.

The awakened appreciation of the Greek and Roman classics exerted no small influence upon the arts of design in the fifteenth and sixteenth centuries, and architects, sculptors, and painters eagerly studied the remains and ruins of ancient art. That the antique was appreciated at a high value may be learned from the writings of the time, in which the work of contemporary artists was constantly compared with that of their predecessors of ancient Greece and Rome.

Michelangelo himself made an imitation of an antique statue for the purpose of selling it as a genuine antique, and, what is more, did so sell it through an agent; and this, while not a particularly creditable example, is an instance of the value put upon works of reputed antiquity.

Many of the Italian villas of the Renaissance period remain to show how wisely they were planned; and while some of these are perhaps more picturesque in their present ruined state, the majority have suffered severely from the tooth of time and the stupidity and vandalism which have robbed them of much of their ordered stateliness and tasteful decorations.

The introductions to the tales of Boccaccio present charming descriptions of the villas of his time, and would not be out of place in an essay on formal gardens, although a technical review can hardly be expected to offer its readers quotations from the Decameron.

While the Italian artists of the Cinque Cento may have been influenced to some extent by classic traditions, their own just appreciation of the advantages to be derived from the intimate association of the works of man and of nature in architectural design was their strongest incentive in the planning of formal gardens; and exactly the same reason may be advanced in this country to-day, in pleading for the formal treatment of grounds and gardens.

It may be said that our climate and landscape are so different

from those of Italy that Italian gardens would be incongruous here; but it is the architectural principle which remains the same, while details may be altered or adapted to the altered conditions. As a matter of fact, we have almost a Neapolitan summer as compensation for our rigorous Siberian winter; and while we have no stone pines, or indigenous orange or bay trees, wherewith to form the perspectives of avenues, or to beautify our gardens, our American pines, firs, and cedars possess as much character, albeit of a different sort; while the bay trees and orange trees may be kept indoors during the cold and inclement season, to be brought out with the other summer paraphernalia to deck our gardens during the warm months. The charm of marble or terra-cotta columns and statues against

SMALL FOUNTAIN AND BALUSTRADE ON THE TERRACE OF THE VILLA BORGHESE, ROME.

a background of glossy green is as delightful in summer in New England as under the softer blue of the Italian sky. At any rate, we live in America, not Italy, and if we cannot enjoy all the delights of that summer clime all the time, that is no reason why we should be debarred from their enjoyment while we may.

The term "formal garden" has been a stumbling block to many, for we Americans dislike the notion of being formal anywhere, especially in our homes. But formality in garden design should be considered as relating to the plan and arrangement of the garden, not to our use and enjoyment thereof. The achievement of a ten-minute walk in a quarter acre of lawn by tortuous paths through clumps of shrubbery is not an artistic triumph, the landscape gardener to the contrary notwithstanding. This is the sort of art which clutters a drawing room with so much furniture and bric-a-brac that the visitor must tack and go about a dozen times before he finally moors alongside the tea table of the hostess.

Nor should the lover of gardens be faint hearted because his domain is circumscribed and small, nor seek to magnify its area by the exaggeration of nature's unstudied designs. A large house with a correspondingly large garden is desirable; but a small house with a small garden designed in harmony therewith is not to be despised.

Even in towns where the genius of improvement has removed all fences and walls, and everybody's lawn is nobody's lawn, where no house presumes to approach nearer to the street nor to shrink farther back therefrom than its neighbors, where all sense of privacy is lost as soon as we go out of doors, the wise man may contrive a bit of formal garden behind his house, where a brick wall or modest hedge will serve to bound his little paradise, within which graveled walks bordered with orderly box, a tinkling jet of water, a few orange or bay trees set in terra-cotta pots, and even a statue or two, with gay flower beds in their season, will all combine to make his peace secure and his happiness complete.

The best inspiration for such simple efforts, as well as for more

IN THE GARDEN OF THE FRENCH ACADEMY, ROME.

important and impressive schemes, may be found in the old gardens of the Old World; and for those who have neither opportunity nor inclination to go abroad to visit them, books have been written and illustrated on the subject; the most suggestive of them being that called "Italian Gardens," by Charles A. Platt, an American artist whose high reputation as a painter and etcher seems likely to be eclipsed by his triumphs in the planning of formal gardens in the United States.

NOTHING more clearly marks the line which separates the good from the vulgar artist than the power which the former always retains to use and not abuse his material, or his opportunities for its free use. The good artist in brick values properly the use of molded brick and terra-cotta, and uses them whenever he can do so safely and artistically. The bad artist seems, on the other hand, to rejoice in the endless profusion of ornament with which the cheap reproduction of molded forms supplies him; and the consequence is, that in some of the fronts of the later Italian churches we are annoyed and disgusted by the endless repetitions of features which would never otherwise have been marked at all. Such are the rich string courses, and eaves, and gable moldings, which are everywhere to be seen, and which ought never to be imitated. — *British Brick-builder.*

Fire-proofing.

SIMPLE RULES FOR FIGURING THE STRENGTH OF TERRA-COTTA ARCHES.

BY HENRI G. CHATAIN, E. E., AND WM. M. EVERETT.

MANY excellent treatises have been written on the theory of the masonry arch and much concise information may be derived from them, but generally for the architect or builder who desires the needed information quickly these works are too complex and usually buried under a heap of mathematics. This article, like others of the same class, contains facts and principles that have been long and widely known combined with as little mathematics as possible.

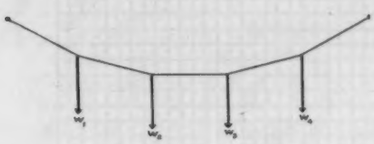


FIG. 1.

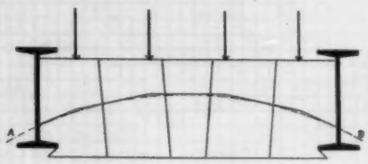


FIG. 2.

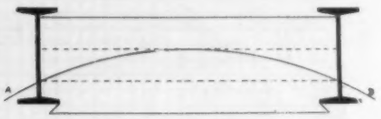


FIG. 3.

Let us first consider the "flat arch." If a straight line be drawn through each joint of the arch "blocks" (voussoirs) representing the position and direction of the resultant of the pressures at that point, the straight lines so drawn form a polygon, and each of the angles of that polygon is situated in the line of action of the resultant external force acting on the arch blocks, so that the polygon is similar to a polygonal frame loaded at its angles with the forces which act on the arch blocks (their own weight included). A curve inscribed in that polygon so as to touch all its sides is the *line* of *pressures* of the arch. For an example of the above, assume an elastic cord loaded as in Fig. 1.

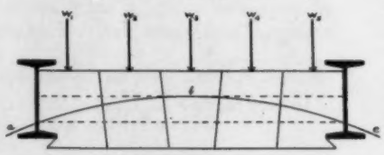


FIG. 4.

Now let us reverse the conditions and superimpose the loads W_1, W_2, etc., upon the arch, and for illustration we have Fig. 2. The line of pressures would be as represented by AB. But the smaller and more numerous the arch blocks into which the arch is subdivided, the more nearly does the polygon coincide with the curve; and the curve, or line of pressures representing an ideal linear arch, which would be balanced under the uniformly distributed forces which act on the real arch under consideration. The points where the linear arch cuts the joints in the arch may be taken, without any great error, for the center of resistance.

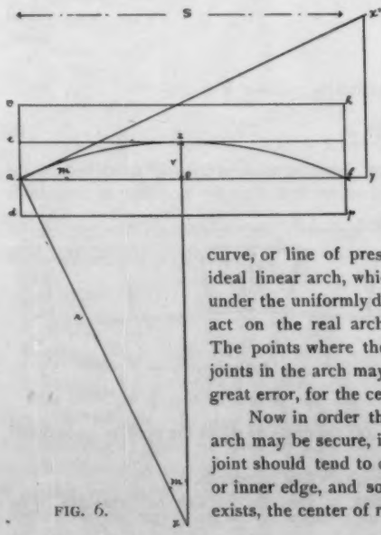


FIG. 6.

Now in order that the stability of the arch may be secure, it is necessary that no joint should tend to open either at its outer or inner edge, and so that such a condition exists, the center of resistance of each joint should not deviate from the center of the joint by more than one sixth of the depth of the arch; that is to say, the center of resistance should be within the *middle third* of the depth of the arch. Fig. 3 shows where line of pressure should be in a properly constructed and loaded arch.

AB shows the line of pressures, and dotted lines show the middle third. From which follows the well-known theorem: The stability of an arch is secure if a linear arch balanced under the forces which act on the real arch can be drawn within the middle third of the depth of the arch. It is true that arches have stood, and still stand, in which the centers of resistance of the joints fall beyond the middle third of the depth of the arch, but the stability of such arches is precarious. To insure stability of friction between the mortar and blocks themselves, the normal to each joint must not make an angle greater than the angle of repose (for the material in question) with a tangent to the line of pressures drawn through the center of resistance of that joint, but for our requirements under ordinary conditions, if blocks are used with a batter of one inch to the foot, the angle of repose for terra-cotta and mortar will not be exceeded.

In our following deductions a resistance to compression of 208 lbs. per square inch, which is considered safe by the New York Building Department, will be used, and introduced for convenience in the formulas directly. Judging from numerous tests made upon the material, which vary from 1,000 lbs. to 3,000 lbs. per square inch as the ultimate resistance to crushing, 208 lbs. per square inch would seem safe enough. It is further assumed that the arches are properly set with cement mortar, especially where they abut beneath the beams or supports as usually set.

FIG. 5.

Assuming that we are to determine the allowable load per square foot upon an arch, let us take any arch, as Fig. 4, made of blocks of any given length, say one foot long, and through the middle third pass an assumed line of pressures (segment of circle) through the points *abc*.

The concentrated loads W_1, W_2, W_3, W_4, W_5 (placed as shown in the diagram) which would produce this particular line of pressures may be determined graphically as follows:—

Lay off (Fig. 5) AB $= \frac{W_3}{2}$

Through A perpendicular to AB draw a line Ax any length.

Now on the curve *abc* (Fig. 4) draw a tangent to a point midway between W_2 and W_4, and ascertain its slope, and draw a line with same slope through B (Fig. 5) intersecting Ax at C. Then lay off DB $= W_4$ and DE $= W_5$. Draw EC and DC.

These two last lines will also be tangential to the line of pressures at points midway between the points of loading.

Assuming that the area of a section of arch 1 ft. wide is A, then our total safe resistance to compression would be 208 A; but the weakest points in our arch are the points *a*, *b*, and *c* (Fig. 4), where the line of pressures touches the upper and lower third of the arch, so the pressure at these points would therefore be equal to twice the mean pressure on the total block, or

DIAGRAM OF ALLOWABLE LOADS.

SIDE–CONSTRUCTION "FLAT ARCHES." [MATERIAL SEMI–POROUS.]

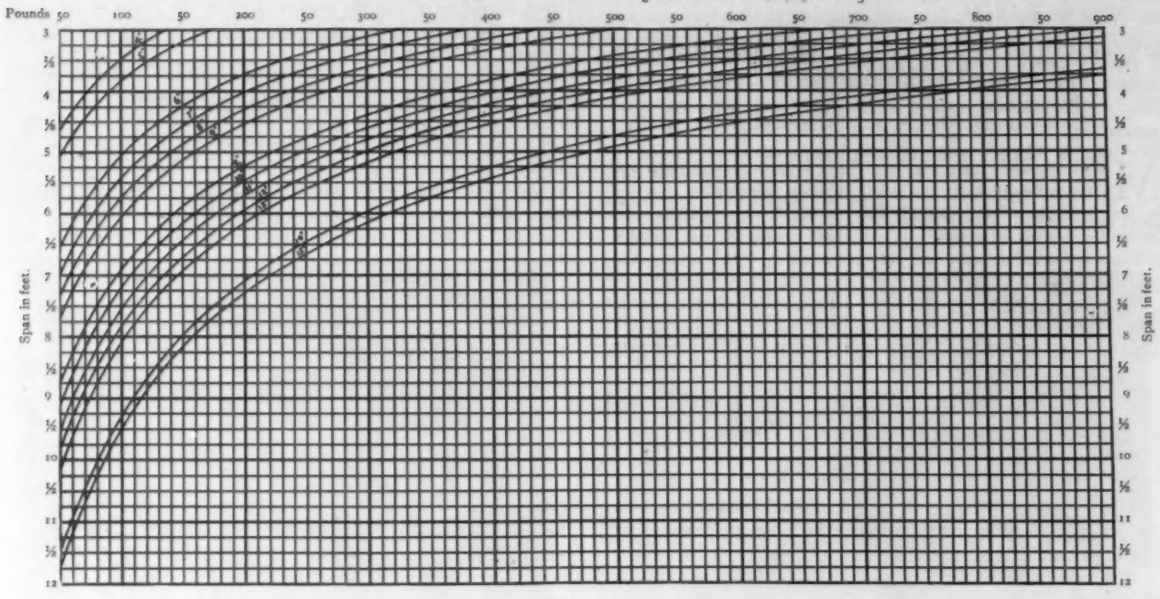


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PLATE 1.

$$\frac{208\ A}{2} \qquad (a)$$

equals greatest allowable pressure in pounds, or graphically in the case in question, equal to the line EC. Therefore, comparing EC and ED, we can obtain the value in pounds of ED, which would be the allowable safe load per square foot of arch.

Let the rectangle *cdhp* (Fig. 6) represent any "flat arch."

$\therefore r = r'$ and $x'y = ao$ or $\frac{S}{2}$

$$r = \frac{V^2 + \frac{S^2}{4}}{2\ V}.$$

Or very nearly $r = \frac{S^2}{8\ V}$ ..... (1

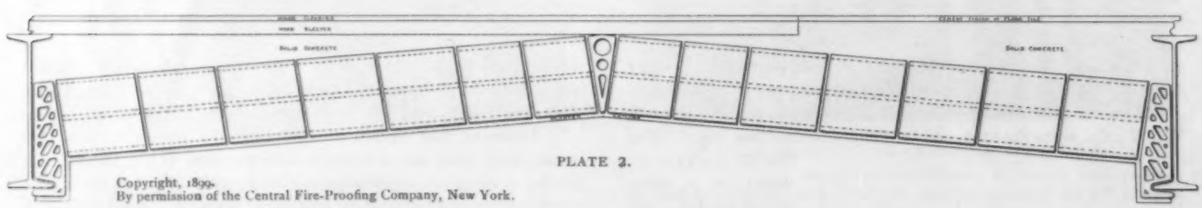

PLATE 2.

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Let $ce = ea = ad$ by construction.

$ab = S$ = span of arch.

$ea = V = \frac{cd}{3}$.

D = depth of arch.

Pass an arc of a circle through *axb* with *x* as the center.

Also $V = \frac{D}{3}$, substituting value of V in (1).

$$r \text{ or } r' = \frac{S^2}{2.7\ D} \qquad (2)$$

From the graphical demonstration previously described of the line of pressures in arches, we find that ax' is equal in magnitude

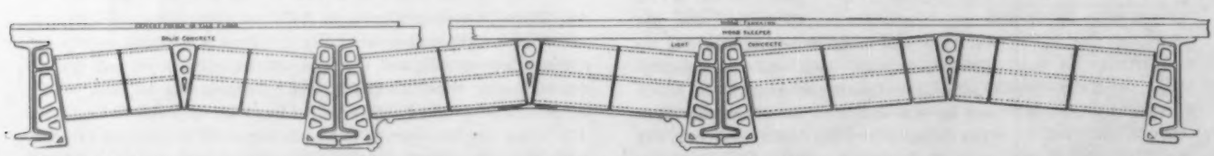

PLATE 3.

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Draw *sx* perpendicular to *es*.

Draw *ax*, and ax' perpendicular to ax; $\therefore$ by construction ax' will be tangent to the arc *axb*, at the point *a*.

Lay off $ax' = ax$, and draw $x'y$ perpendicular to *ay*.

Then by similar triangles and construction we have $ax'y = aox$.

and direction to the maximum pressure when the arch is considered loaded uniformly.

Let W = load per square foot in pounds.

T = total resistance in direction of line of pressures. [In pounds.]

A = the least cross sectional area of an arch 1 ft. wide.

From equation (*a*)

$$T = 104\ A \quad \ldots\ldots (3)$$

$$\therefore Wr' = T \ (r' \text{ in linear feet expressed as units}) \quad \ldots\ldots (4)$$

Substitute values in (4) of T and r' from (2) and (3).

$$W\frac{S^2}{2.7\ D} = 104\ A.$$

Reducing and transposing,

$$W = \frac{280.8\ AD}{S^2}$$

Or approximately,

$$\text{Formula:}\quad W = \frac{280\ AD}{S^2} \quad \ldots\ldots (A)$$

In which

A = least cross sectional area of an arch one foot wide. [In square inches.]

D = total depth of arch. [In feet.]

S = span of arch. [In feet.]

W = allowable load per square foot. [In pounds.]

Plate 1 shows a series of curves obtained by means of formula A. The calculations were made on that style of arch which is generally used, *i. e.* parallel webs and shells of ½ in. thickness. The allowable load per square foot for an arch at any span will be found directly above the intersection of the line representing the span and the curve representing the arch.

It will be noted in the diagram that two 9 in. arches are given, but this is due to the fact that the calculations were based on two different sections, of one and two horizontal webs respectively. It is not advisable to use formula A for very small spans, as the error in the formula becomes excessive, but for all practical spans it is near enough.

A new style of arch, the "serrated arch" recently devised by Henry L. Hinton, of the Central Fire-proofing Company of New York, is here illustrated in Plates 2 and 3. These arches will be fully described in future articles and their adaptability to various requirements will be shown.

A formula especially applicable to this style arch has been deduced and is as follows: —

From the demonstration of "flat arches" we have

$$r = \frac{S^2}{8\ V} \quad \ldots\ldots (1)$$

In this case $V = \frac{D}{3} + x$, in which x = rise of arch in feet.

Substituting this value of V in (1),

$$r = \frac{S^2}{\frac{8\ D}{3} + 8\ x}$$

But $W\ r = T$.

$T = 104\ A$.

$$\therefore \frac{WS^2}{\frac{8\ D}{3} + 8\ x} = 104\ A.$$

Transposing and reducing, we have approximately

$$W = \frac{280\ A\ (D + 3\ x)}{S^2} \quad \ldots\ldots (2)$$

In the "serrated arch" $x = \frac{S}{24}$, *i. e.* ½ in. rise per foot of span.

Substituting this value in (2),

$$W = \frac{280\ A\ (D + \frac{S}{8})}{S^2} \quad \text{Or,}$$

$$\text{Formula:}\quad W = \frac{280\ AD}{S^2} + \frac{35\ A}{S} \quad \ldots\ldots (3)$$

The notation in (3) is of course the same as that used in the "flat arch" formula. In case a rise of other than ½ in. per foot of span, formula (2) could be used by substituting the proper value for x, but it must be expressed in feet. However, it is advisable not to use this formula for a rise greater than 1 in. per foot of span. For greater rises and regular segmental arches a formula will be given.

Fineness of Cement.

BY IRA O. BAKER.

M. Am. Soc. of C. E., Professor of Civil Engineering, University of Illinois.

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CEMENT until ground is a mass of partially vitrified clinker, which is not affected by water, and which has no setting power. It is only after it is ground that the addition of water induces crystallization. Consequently the coarse particles in a cement have no setting power whatever, and may for practical purposes be considered as so much sand and essentially an adulterant.

There is another reason why cement should be well ground. A mortar or concrete being composed of a certain quantity of inert material bound together by cement, it is evident that to secure a strong mortar or concrete, it is essential that each piece of aggregate shall be entirely surrounded by the cementing material, so that no two pieces are in actual contact. Obviously, then, the finer a cement the greater surface will a given weight cover, and the more economy will there be in its use.

Fine cement can be produced by the manufacturers in three ways: (1) by supplying the mill with comparatively soft, under-burnt rock, which is easily reduced to powder; (2) by more thorough grinding; or (3) by bolting through a sieve and returning the unground particles to the mill. The first process produces an inferior quality of cement, while the second and third add to the cost of manufacture.

It is possible to reduce a cement to an impalpable powder, but the proper degree of fineness is reached when it becomes cheaper to use more cement in proportion to the aggregate than to pay the extra cost of additional grinding.

There has recently been introduced an article called sand-cement, which is made by mixing cement and silica sand, and then grinding the mixture. The grinding of the mixture greatly increases the fineness of the cement. A mixture of one part cement and three parts silica sand when reground will carry nearly as much sand as the original pure cement, which shows the striking effect of the very fine grinding of the cement. This statement is illustrated by the following data, which came before the writer in a purely accidental way while this article was in process of preparation.

Proportions.		Age when tested.	Ordinary Portland cement.	Sand-cement, reground.
Cement.	Sand.			
1	0	6 days.	392	217
1	0	13 days.	494	236
1	0	20 days.	462	277
1	0	27 days.	513	304
1	0	3 months.	577	365
1	0	6 months.	639	484
1	1	6 days.	232	164
1	1	27 days.	345	279
1	2	6 days.	175	130
1	2	27 days.	214	227
1	3	6 days.	139	89
1	3	27 days.	178	155
1	4	6 days.	102	57
1	4	27 days.	143	115

The sand-cement employed in securing the results in the last column is the Portland cement, giving the results in next to the last column, mixed one part cement to two parts silica sand and then reground. The tests were made under identical conditions, and hence the results are at least relatively correct. The data is not the most striking that could be formed, but it serves to illustrate the advantage of fine grinding. On the average, the American Portland cements are considerably finer ground than the imported.

Incidentally fineness is tested when in determining the tensile strength of a mortar a mixture of cement and sand is employed. However, it is wise to determine the fineness also directly by sifting through one or more sieves, since the results of tests with sand are liable to a wide difference due to the character of the sand, and consequently it is not always possible to know whether the difference is due to the sand or to fineness of the cement.

MEASURING FINENESS.

The degree of fineness is determined by weighing the per cent. which will not pass through sieves of a specified number of meshes per square inch. In the past, three sieves have been used for this purpose, viz.: sieves having 50, 75, and 100 meshes per linear inch or 2,500, 5,625, and 10,000 meshes per square inch respectively. These sieves are usually referred to by the number of meshes per linear inch, the first being known as No. 50, the second as No. 75, and the third as No. 100. In each case the diameter of the mesh is about equal to that of the wire. The per cent. left on the coarser sieves has no special significance, and hence the use of more than one sieve has been almost abandoned. More recently in this country a No. 120 sieve (14,400 meshes per square inch) has been employed, and sometimes a No. 200. On the continent of Europe the sieve generally used has 70 meshes per linear centimeter, corresponding to 175 meshes per linear inch (30,625 per square inch).

DATA ON FINENESS.

Nearly all Portland cements are so ground as not to leave more than 20 per cent. on a No. 100 sieve, and many of them will not leave more than 10 per cent. on a No. 100 sieve or more than 20 per cent. on a No. 200 sieve, and some manufacturers claim less than 10 per cent. on a No. 200 sieve. As a rule, American Portlands are finer ground than German, and German finer than English.

Most of the natural cements are usually ground so as to give not more than 20 per cent. on the No. 100 sieve; and many of them will not leave more than 10 per cent. on the No. 100 sieve; and a few will leave only 10 per cent. on the No. 200 sieve.

A common specification is that not more than 10 per cent. shall be left on a No. 50 sieve. Such a test simply prevents the adulteration of the cement with very coarse particles, but does not insure any considerable proportion of impalpable powder (approximately that which will pass a No. 200 sieve), which alone gives value to the cement.

Since the natural cement is not so hard burned as the Portland, there is more impalpable powder in proportion to the per cent. left on the test sieve than with the Portland; and consequently a severe test for fineness is not as important for natural cement as for Portland. Farther, since natural cement is much cheaper than Portland, it is more economical to use more cement than to require extra fineness. Again, since natural cement is weaker, it is not ordinarily used with as large a proportion of sand as Portland, and hence fineness is not as important with natural as with Portland.

MOST ECONOMICAL CEMENT.

It not infrequently occurs that several samples of cement are submitted, and it is required to determine which is the most economical. One may be high priced and have great strength; another may show great strength neat and be coarsely ground. If the cement is tested neat, then strength, fineness, and cost should be considered; but if the cement is tested with the proportion of sand usually employed in practise, then only strength and cost need to be considered.

Table I. shows the method of deducing the relative economy when the cement is tested neat; and Table II. (repeated from page 189, Vol. VII., for sake of comparisons) shows the method when the cement is tested with sand. The data are from actual practise, and the cements are the same in both tables. Results similar to these could be deduced for any other age; the circumstances under which the cement is to be used should determine the age for which the comparison should be made.

The above method of selecting the most economical cement gives the advantage to a cement which gains its strength rapidly and which is liable to be unsound. Therefore this method should be used with discretion, particularly with short-time tests.

TABLE I.

RELATIVE ECONOMY OF CEMENTS TESTED NEAT AT 7 DAYS.

Cements.	Fineness.		Tensile strength.		Cheapness.		Relative economy.	
	Per cent. passing No. 100 sieve.	Relative.	Pounds per square inch.	Relative.	Cost per barrel.	Relative.	Product of relative fineness, relative strength, and relative cost.	Rank.
A	90.0	98.1	628	81.5	$2.30	100.0	79.95	2
B	88.0	95.9	771	100.0	2.34	98.3	94.26	1
C	88.7	96.6	477	61.9	2.40	95.8	57.28	4
D	91.8	100.0	391	50.7	2.45	93.8	47.55	5
E	81.5	88.8	660	85.6	2.47	93.1	70.79	3

TABLE II.

RELATIVE ECONOMY OF CEMENTS TESTED WITH SAND AT 7 DAYS.

Cements.	Tensile Strength, 1 C. to 3 S.		Cheapness.		Relative Economy.	
	Pounds per Square Inch.	Relative.	Cost per Barrel.	Relative.	Product of Relative Strength and Relative Cost.	Rank.
A	168	95.4	$2.30	100.0	95.40	2
B	176	100.0	2.34	98.3	98.30	1
C	166	94.3	2.40	95.8	90.33	3
D	133	76.7	2.45	93.8	71.94	4
E	135	76.7	2.47	93.1	71.40	5

THE Portland cement industry in 1898 will probably show an advance in production over that of 1897 quite equal to that of 1897 over 1896. It is conservatively estimated by good authorities that the output in the Lehigh Valley in 1898 was about 2,500,000 barrels, or nearly 1,000,000 barrels more than in 1897, and that the American production in 1898 will reach 3,500,000 barrels. It is also estimated that the production in the Lehigh Valley will increase in 1899 over 1898 from 900,000 to 1,000,000 barrels, making the output of Portland cement in the United States for the present year approach 4,500,000 barrels. The imports during 1898 and again in 1899 will probably decrease, as the reports of the Bureau of Statistics of the Treasury Department for the fiscal year ending June 30, 1898, show a decrease in the first six months in 1898 over the imports for a similar period in 1897.

Unfortunately, in the reports which are available, there are no statistics of the amount of silica or sand-cement and of the several kinds of slag cement which are produced in this country. These industries, however, do not turn out a sufficient output to be seriously considered. It is understood that the manufacturers of slag cement are turning their attention to the production of normal Portland, if possible, from their slags by amending their composition and burning them to a clinker. It is stated that the use of the rotary kiln has continued to increase in this country, 49 per cent. of the total product having been burned in this way in 1897.

The production of natural cement increased in 1897 over 1896 by 341,238 barrels, or 4.28 per cent. As the capacity for production exceeded the demand by about 25 per cent., prices were somewhat depressed. As the manufacture of Portland cement develops in this country it is probable that that of natural cement will gradually decrease.

For the year the total output of natural cement was 8,311,688 barrels, more than one half being made in New York State.

Brick and Terra-Cotta Work in American and Foreign Cities, and Manufacturers' Department.

THE BRICK ARCHITECTURE OF WASHINGTON, D. C

BY F. W. FITZPATRICK. (*Concluded.*)

WASHINGTON is famed for its homes; a city of homes perhaps more than a city of churches even. Statesmen during their terms of office reside here from necessity, become enamored of the place — and it *is* naturally and artificially a beautiful city — and continue to reside here from choice. Men of large interests come here on a visit, or to foster those interests, — it is also a great place for fostering, — fall a prey to the same charms, and build expensive homes. Men retired from business come here to acquire the social distinction their families crave for, and then others come to live with us because still others are here. Like a great snowball, rolled by our enthusiastic progeny, Washington keeps on gathering wealthy residents, and she can boast of being second only to New York in the lavishness and number of her expensive homes. Many are built of brick, some have cost fortunes, some have broken their owners. The streets are wide, beautiful trees, fine vistas, elegant opportunities, but you can count the really artistic, beautiful exteriors on your fingers, and I'll not swear that you cannot count them on the fingers of one hand. And why? It is one of the unsolved mysteries of the times. Boston, New York, Philadelphia, Chicago, Minneapolis, Cleveland, Detroit, Denver, and Portland, in far-away Oregon, can show, not only proportionately, but, regardless of size, far more beautiful homes, tastily designed (and evidently designed for the places they occupy) than can Washington; and few homes in those cities, excepting, of course, in New York, have cost nearly as much as ours. I can recall but two places where the domestic architecture struck me as being generally as unimpressive, except for its ugliness, as that of our nation's capital, — London and San Francisco. There may be others, but those three places I think ought to be crowned as *hors concours*. There are expensive homes on Massachusetts, on Connecticut, and Rhode Island Avenues, Columbia Heights, and dotted all over the northwestern part of the city; a great many of them of brick, and generally the most expensive ones, the aggressively conspicuous ones are chiefly conspicuous for their inartistic qualities.

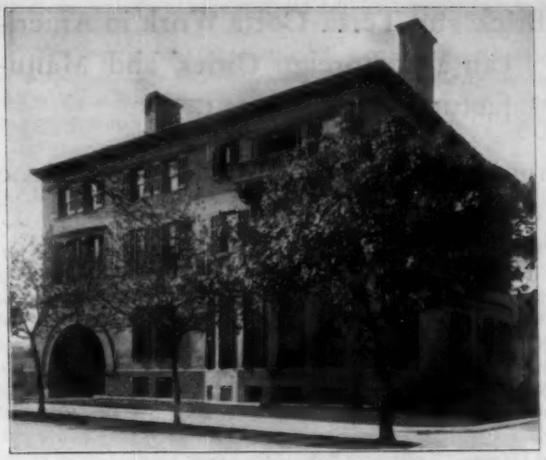
RESIDENCE, SECRETARY JOHN HAY, WASHINGTON.
H. H. Richardson, Architect.

RESIDENCE, THOMAS NELSON PAGE, WASHINGTON.
McKim, Mead & White, Architects.

RESIDENCE, L. Z. LEITER, DUPONT CIRCLE, WASHINGTON.
F. P. Chandler, Architect.

The middle-aged brick homes of importance are the English Embassy, the Pollock house (whose master and mistress went down upon the ill-fated *Bourgogne*), and the Blaine (now the Westinghouse) home. These are large and quite ordinary in design, and that is all that can be said of them. The Stewart "Castle," as it is called, fortunately is stuccoed, so few know it to be brick, and for the sake of brick I am glad of it. The Leiter home is probably the most striking brick house here, a light cream brick with gray stone trimmings, rather attractive, well detailed, or, at least, not sinning very grievously; though if Mr. Chandler had it to do over again, I doubt if he would be satisfied with the same lines. It certainly occupies the finest site in town, an ideal lot for a mansion, and about the most conspicuous one, too. Allah be praised! that the house is not only "good" but "quite good"; in fact, judged by the Washington standard, it is "perfect."

RESIDENCE, MRS. JENNESS MILLER, WASHINGTON.
F. F. Schneider, Architect.



RESIDENCE, W. J. BOARDMAN, WASHINGTON.
Hornblower & Marshall, Architects.

Thomas Nelson Page has recently finished a brick home by McKim, Mead & White that attracts a great deal of attention. A mottled gray Roman brick with white trimmings, colonial in style, chaste, offending none of the canons, it merits attention and certainly represents one finger when you count up the really good houses here. That I do not like the style and question the propriety of using something that one instinctively feels ought to be surrounded by a fine lawn, stately trees, fountains, and winding drives right on a town lot, bang up to the sidewalk, should not reflect against it — but one may express an opinion.

RESIDENCE, W. C. WHITTEMORE, WASHINGTON.
Harvey Page, Architect.

The Hay-Adams double house (Secretary of State Hay), by Richardson, shows what can be done in brick. It is a red brick, and nearly all the upper detail is in brick; the lower story is of buff sandstone. There is some rather good brick carving, good window treatment, altogether one of the few really good brick structures, public or domestic, here. The usual gloom of a red brick is relieved by dashes of ivy, fern, and palms, accessories that are not to be despised by the architect.

The other important brick houses here are shown by the accompanying illustrations. There is really nothing in most of them that would justify more than a photograph. There are quite a number of narrow "fronts" of brick, 25 and 30 ft.

RESIDENCE, SENATOR FORAKER, WASHINGTON.
Paul J. Peltz, Architect.

RESIDENCE, SENATOR HALE, WASHINGTON.
Roach & Tilden, Architects.

party-wall affairs, that are not bad; but even among these only one or two merit a place in an architect's portfolio; that is, if he uses his portfolio to browse in for ideas, or to gauge what is being done worthy of note by his fellows.

. . . . . .

Brick has been made in and about Washington for many years. In the fifties there was a rather handsome red brick made here and in Alexandria. One or two moldings, an egg-and-dart, and a dentil were made; the bricks used for face work were gauged and rubbed, and very good work indeed was the result. To-day there is but one pressed-brick works here, to my knowledge; from 70,000,000 to 150,000,000 of a very good common brick are made, and on January 25 last nine of the fourteen plants combined under one management, and their product sells for about $8.50 a thousand, "kiln-run."

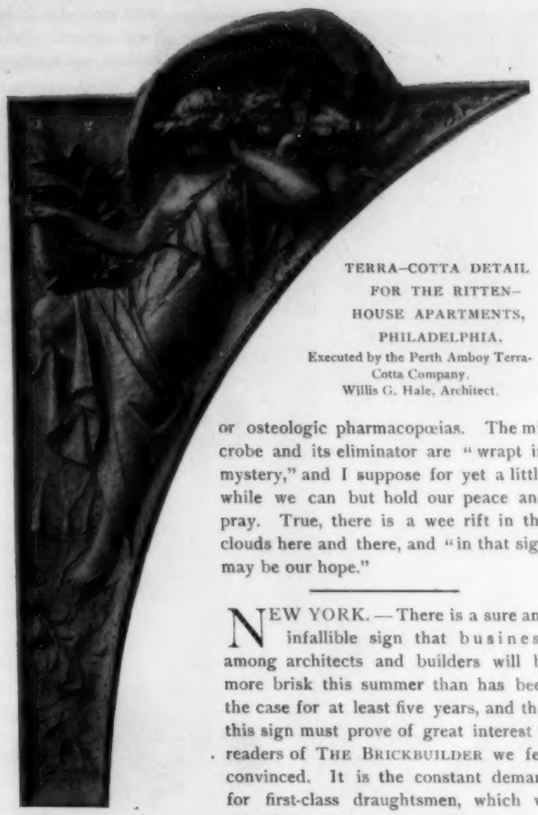
. . . . . .

In glancing over this paper, in order to properly place the illustrating photos (most of them and the views in Annapolis contributed by Mr. Frank Upham, of Mr. Cobb's Washington office, a young camera as well as architectural enthusiast, and to whom I

RESIDENCE, MRS. GEORGE W. CHILDS.
Furness & Evans, Architects.

am greatly indebted for adding pictorial interest to matter that could not, by any stretch of courtesy or generosity, be considered as interesting *per se*), I am compelled to acknowledge that the impression they leave upon me, an unprejudiced reader, is that they are the handiwork of a dyspeptic. I assure you I am not, however; my health and digestion are of the very best and my temperament, under ordinary circumstances, most seraphic; nor am I generally hypercritical. But knowing the beauties that can be extracted from brick, and having seen that they have been taken advantage of elsewhere, it makes me exceedingly wroth, aye, willing to commit a breach of the peace even, to see how in this grand city, that every one visits, the cynosure not only of neighboring but of *all* eyes, and where there are so many such grand, such masterly works in stone, that nearly every time that brick has been used, or is used, all its beauties have been extracted — when the architects made their drawings! And one cannot lay all the blame at the doors of our local *confrères*. While perhaps sharing in the guilt, they are not the worst offenders. Our buildings are cosmopolitan as far as architects are concerned. New York, Boston, Philadelphia, and even the West, all have sinned here in brick, and sinned most grievously, too.

The causes leading to these sins are more or less evident, but for a remedy one will seek in vain through allopathic, homeopathic,



TERRA-COTTA DETAIL FOR THE RITTENHOUSE APARTMENTS, PHILADELPHIA.
Executed by the Perth Amboy Terra-Cotta Company.
Willis G. Hale, Architect.

or osteologic pharmacopœias. The microbe and its eliminator are "wrapt in mystery," and I suppose for yet a little while we can but hold our peace and pray. True, there is a wee rift in the clouds here and there, and "in that sign may be our hope."

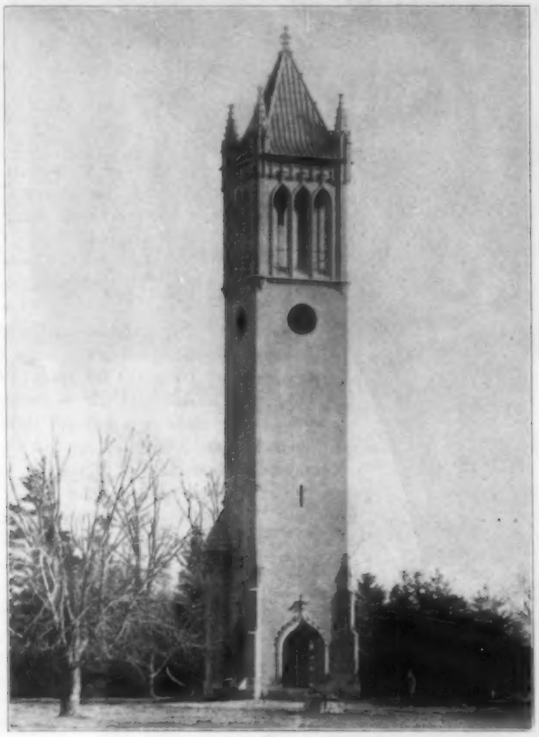
NEW YORK. — There is a sure and infallible sign that business among architects and builders will be more brisk this summer than has been the case for at least five years, and that this sign must prove of great interest to readers of THE BRICKBUILDER we feel convinced. It is the constant demand for first-class draughtsmen, which we trust for the sake of the advance guard of the great army of draughtsmen will result in a return to the old-time good salaries which first-class men received some years ago. Upon investigation we find that this promised season of activity will be mainly among the architects, whose work lies in the direction of apartments and suburban homes, although many corporations who held off on account of the late war have become infected with the feeling of confidence and security which is abroad and are now ready to invest.

During the past year there has been a decided falling off in the number of large office buildings built, and in this column about a

TERRA-COTTA CAPITAL.
Executed by the New Jersey Terra-Cotta Company.

year ago we expressed a fear that there was an over-supply of such large buildings, many of which are capable of housing the inhabitants of a city. We also expressed the confidence that we felt in the well-established corporations and shrewd business men who com-

posed the syndicates by whom these buildings were erected. It has been abundantly proved that this last surmise was correct. Never has there been such a demand for offices in modern well-equipped



A MEMORIAL CAMPANILE, IOWA STATE AGRICULTURAL COLLEGE.
Geo. E. Hallett, Architect.

fire-proof buildings, and we can now safely say that there is room for more of them. Strange to say, the rents charged for offices in these buildings are the same or very little more than the rents charged for offices of equal size in old ramshackle buildings with no modern equipments. Even the enormous Park Row Building, which we thought would be hard to fill, promises to prove a bonanza. In spite of the large floor area, owing to the peculiar advantages of the lot, it has not an office which is not abundantly lighted,

PANEL, BAY WINDOW CURTAIN WALL.
Executed in terra-cotta by the Northwestern Terra-Cotta Company.

and as a step in advance there is a telephone in every office which connects with the public telephone on the ground floor.

At the time of this writing there has been another fire horror in New York in which thirteen lives were lost. The fire occurred at 2 A. M. in a modern four-story residence in the "millionaire" district. It seems as though American wealth and ingenuity should be equal to the task of constructing dwellings which are something better than fire-traps. The Windsor disaster has caused no end of bills to be introduced at Albany with the design of rendering hotels less dangerous; but what are we to do about the thousands of private dwellings? We have a fire department of which we are justly proud, but when a fire occurs in the lower part of a dwelling the most heroic exertions fail to rescue the inmates. Even if the inmates contrive to reach the upper windows there is no way to descend, and unless rescued with difficulty from without they are doomed to horrible death. In case of fire the residences of the wealthy are in most instances more dangerous than the tenements of the poor, for the law compels the erection of fire escapes upon these, while the owner of a private residence will not disfigure it with these contrivances and objects to the existence of a fire-engine house in his immediate neighborhood. It certainly should be possible to descend from the upper floors by ladders or stairways *outside* the house. These could be arranged on the rear, where they will not disfigure the appearance of the house, or one of the many patent fire escapes which roll up like rope ladders and are attached to the sills could be used. With the cheapening of iron and other non-combustible building materials, future structures should be made safe. If they are not absolutely "fire-proof," the fire would be confined long enough to give the inmates a chance to escape. That the casual ignition of a curtain should lead to the heartrending casualties which we so frequently read about is too dreadful to be tolerated by a wealthy, ingenious, and intelligent people.

TERRA-COTTA PANEL FOR RESIDENCE AT PHILADELPHIA.
Executed by the Conkling-Armstrong Terra-Cotta Company. Baker & Dallett, Architects.

The following items of new work have come to our notice:—

Babb, Cook & Willard are at work upon plans for a palatial mansion to be built for Mr. Andrew Carnegie, on Fifth Avenue between 91st and 92d Streets. Mr. Howard Gould has purchased a site for a handsome residence on the corner of Fifth Avenue and 73d Street. Howard & Cauldwell have filed plans for a twelve-story hotel, to be built of limestone and brick, and to be erected at Madison Avenue and 56th Street; cost, $250,000. Albert E. Parfitt is preparing plans for a new parish building and rectory, to be built for St. Augustine's Roman Catholic Church, at the corner of Park Place and Sixth Avenue, Brooklyn; cost, $150,000. McKim, Mead & White have prepared plans for a new hospital, to be erected on First Avenue and 27th Street; cost, $500,000. C. L. W. Eidlitz has planned a three-story brick building for the New York and New Jersey Telephone Company, to be erected on 58th Street; cost, $30,000. C. P. H. Gilbert is preparing plans for a six-story brick store and office building, to be built on Fifth Avenue; cost, $100,000. Barney & Chapman have planned a ten-story hotel building, to be built for the White estate on Seventh Avenue, corner of 38th Street; cost, $450,000. Clinton & Russell

TABLET ON EACH SIDE OF PRINCIPAL ENTRANCE TO CENTENNIAL BUILDING, BROAD STREET, NEW YORK.
Work executed by the New York Architectural Terra-Cotta Company.
Ralph Townsend, Architect.

are preparing plans for a six-story brick dwelling, to be built on East 84th Street; cost, $40,000. The same architects have planned three three-story brick dwellings, to be built on East 84th Street; cost, $45,000. J. B. Snook & Sons have planned an eight-story brick store and office building, to be built on Broadway, corner of Warren Street; cost, $150,000. Chas. C. Haight has planned a five-story brick dormitory building for the General Theological Seminary; cost, $65,000. C. B. J. Snyder, architect to the Board of Education, has planned two new schoolhouses, costing respectively $260,000 and $125,000 each. Wm. C. Hazlett has prepared plans for a ten-story store and loft building, to be built on 12th Street, corner University Place; cost, $160,000.

CHICAGO. — Sharp advances in the prices of building materials amounting to at least 12 per cent. threaten to postpone for a considerable period the revival in building operations. Also, just now the usual uncertainty as to labor troubles tends to further retard the launching of new projects.

The younger members of the profession are at present interested in the Twelfth Annual Exhibition of the Chicago Architectural Club, which opened on the 30th inst. at the Art Institute. An unusually large number of drawings has been received from other cities, and the average quality of the work is exceptionally high. A new idea has been adopted in the selection and exhibition of work from the various architectural schools. The number of designs from each school has been limited to fifteen, carefully selected by the several faculties, and all the school work is hung in one room. This should be an incentive to the students, as their drawings, when exceptionally good, are not only seen by many prominent architects, but they are likely to be selected for reproduction in the catalogues — always an honor for young draughtsmen.

Louis H. Sullivan is the architect of the façade of that portion of the new McCormick Building on Michigan Avenue to be occupied by Gage Brothers. Holabird & Roche are the architects for the rest of the work, for which piling is now being driven. This façade is in Mr. Sullivan's best vein. The three units composing the front are unusually wide, and the treatment is severely a lintel treatment: a steel frame simply clothed above the first story in delicately modeled terra-cotta, finely detailed and decidedly geometric in feeling, except in the case of the rich orchid-like bursts of foliated ornament beneath the cornice at the upper terminals of the intermediate pier ribs. The cast-iron covering of the first-story skeleton is decorated with a remarkably beautiful interweaving combination of geometrical and foliated forms. All the upper sash are glazed flush outside with Luxfer prisms.

ORNAMENTAL PANEL, BOYS' INDUSTRIAL SCHOOL, LANCASTER, OHIO.
Executed by the Indianapolis Terra-Cotta Company.
Richards & McCarty, Architects.

The recently issued first triennial report of the State Board of Examiners of Architects gives in detail the results accomplished by the first State law enacted for the legalizing of the profession of architecture and the registration of practitioners. The first meeting of the board was held Sept. 31, 1897, and prior to Feb. 11, 1899, seven hundred and fourteen applications for license had been received and seventy-three rejected. This law, as well as the city ordinance, requiring that all plans submitted to the department of buildings for approval must be stamped by a State licensed architect, seems to be popular; the violators are now few, and none are persistent.

MAIN ENTRANCE, HARTFORD LIFE INSURANCE BUILDING, HARTFORD, CONN.
Executed in gray terra-cotta by the Excelsior Terra-Cotta Company.
F. R. Comstock, Architect.

The Chicago Architects' Business Association has been devoting much time and energy to secure the amendment of the present cumbersome and intricate lien law, and is seeking the aid and support of the Chicago Real Estate Board and the various organizations connected with the building trades. The proposed amendments, if enacted by the legislature before the close of the present session, will probably restrict the operation of the law so that only architects, original contractors, and mechanical labor shall be able to establish a lien.

The present law has worked grave injury to the building interests here, and early relief from some of its most objectionable features is greatly to be desired.

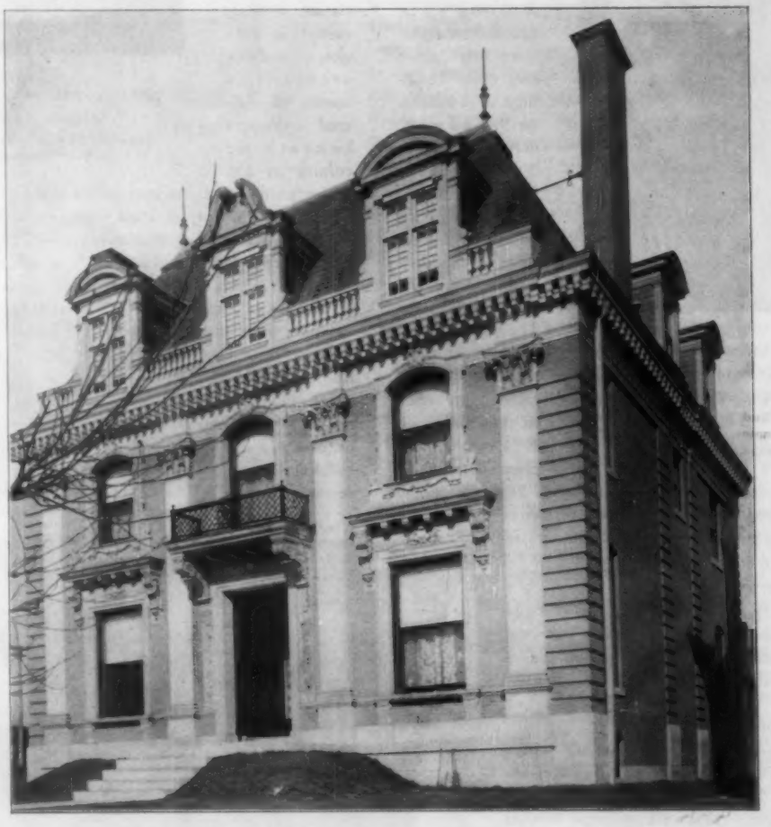
An interesting alteration is in progress on Michigan Avenue, where the Hotel Richelieu, once famous for its rare wines and goodly entertainment under the rule of "Cardinal" Bemis, is being converted into a furniture factory. The entire structure, floors, partitions, everything, has been demolished and removed, leaving only the exterior walls standing without tie or brace of any kind. The front portion is six and the rear eight stories in height. It looks as though a heavy gale from the lake would strike the front wall with dangerous force, but the contractors completed this demolition of the interior over a week ago and seem in no haste to begin the erection of the new, slow-burning construction, or to brace the outer walls.

The building record for March shows that the total cost covered by permits amounted to only $2,405,980. This is $722,240 less than the amount for March, 1898, and is the poorest record for that month during the past ten years in Chicago. The next lowest corresponding record is that of 1895, which was $2,628,890.

Many store front alterations are in progress in the retail district, consisting chiefly of plate glass, Luxfer or other illuminating prisms, and light cast-iron work. Most of the out-of-date commercial structures which were rushed up after the fire seem destined to be thus freshened up to hold their own for a few years longer before being wholly demolished and replaced.

Suburban home building promises to be quite active this season. The early completion of the Northwestern Elevated Road and the extension of the Lake Street Elevated through Austin, by the means of an incline and direct trolley connection west to Maywood, promises to give an impetus to residence work north and west. The long-continued cold of the winter which has prevailed without a break into April, together with the scanty snowfall, leaves the ground still full of frost, and makes the season an unusually tardy one for suburban building operations.

ST. LOUIS.—The general improvement in business during the past two years has caused quite a demand for substantial business houses. As has been previously mentioned, Washington Avenue has become the center of the wholesale and light manufacturing interests. When buildings were erected in the vicinity of 9th Street a few years ago they were considered quite a risk, but almost the entire property to 12th Street has been built up with large buildings, and now Shepley, Rutan & Coolidge are preparing plans for a seven-story building, for the Lindell Real Estate Company, which will cost $200,000 or more; to be located on 12th Street.



RESIDENCE AT ST. LOUIS, MO.
Terra-cotta executed by the Winkle Terra-Cotta Company.
Barnett, Haynes & Barnett, Architects.

The same firm has also prepared plans for a seven-story building for Judge Wilbur F. Boyle, to be erected on Washington Avenue, between 11th and 12th Streets; cost, $55,000.

The St. Louis University has commenced another building on their premises on West Pine Boulevard and Grand Avenue. It is to be four stories high, and contain one hundred rooms. It will be of brick with stone trimmings, and in the Gothic style; cost, $60,000.

The Second Presbyterian Society is about to commence their new church, the chapel of which was built some years ago. It will cost $125,000, and is by T. C. Link. Music-loving people will soon have a music hall, which is being built on Grand Avenue, at a cost of $100,000. Albert Swasey is the architect. Mr. Swasey has also a ten-story building at New Orleans.

Washington University some years ago acquired a tract of land in the vicinity of Forest Park, and is about to commence the erection of several buildings upon same, preparatory to moving the University there at as early a date as possible. A number of the prominent citizens have donated the five principal buildings at a cost of over half a million dollars, while other citizens have contributed to the endowment fund handsomely, increasing it at least by as much more. Landscape architects have been employed and preliminary studies made, but no architect has been selected for the buildings.

Real estate has become quite active, much more so than during

EAGLE FOR THE "REPUBLIC" BUILDING, ST. LOUIS, MO.
Executed in terra-cotta by the Winkle Terra-Cotta Company.
Isaac S. Taylor, Architect.

the several past years, especially in down-town properties, many of these investments looking forward to substantial improvements.

Doubtless the forthcoming World's Fair will have a tendency to stimulate prices and increase the amount of building, but it is believed that there will be no boom, with its evil after effects, such as has been under like conditions in other cities. The matter is as yet only in its preliminary state, but nevertheless the probable site and architects in chief are subjects of general discussion.

MANUFACTURERS' CATALOGUES AND SAMPLES DESIRED.

THE following-named architects would be pleased to receive manufacturers' catalogues and samples: H. C. Evans, Wilmington, Del.; Elmer Gerber, Reibold Building, Dayton, Ohio; Considine & Watz, Elmira, N. Y.

NEW CATALOGUE.

THE Kittanning Brick and Fire Clay Company, Pittsburgh, Pa., has just issued an exceedingly interesting and attractive catalogue descriptive of the various shapes, colors, etc., of the Kittanning Impervious Brick. In the compilation of this work care has been taken to illustrate and describe the product of the plant in such a comprehensive way as to give much valuable information on the subject of the use of brick generally in connection with ornamental and molded brickwork.

In the arrangement of the catalogue mention is made first of the character of the clays from which the Kittanning brick are manufactured, and special stress is given to the soft, warm effects of the various shades of their buff and gray brick, which make them so desirable for use in the construction of municipal buildings. This portion of the work is rendered particularly interesting by a very fine collection of thirty or more illustrations of various types of buildings located in New York, Chicago, Boston, and Buffalo, designed by well-known architects, and constructed of the Kittanning brick. A wide range is covered in the character and style of these buildings, each one of which is selected as being of especial interest as an example of artistic rendering of brickwork.

The main purpose of the catalogue is to show for the convenience of architects using molded brick the large assortment of shapes which the company carry in stock. To this end two hundred different designs of molded brick are illustrated by outline plate drawings reduced to one half scale. Considerable space is also given to scale drawings of details of arches and arch brick.

We heartily recommend to our readers a perusal of this catalogue as being a work of real interest and value in connection with architecture in brick construction. As the number issued by the company is somewhat limited, those wishing a copy should request same at an early date of the Kittanning Brick and Fire Clay Company, Duquesne Way and 10th Street, Pittsburgh, Pa.

CURRENT ITEMS OF INTEREST.

THE BOLLES REVOLVING SASH COMPANY has removed its New York office to 13–21 Park Row.

THE AMERICAN ENAMELED BRICK AND TILE COMPANY has removed its New York office to the Metropolitan Building, 1 Madison Avenue.

MEEKER, CARTER & BOORAEM, New York City, have removed to a larger suite of offices in the Metropolitan Building, 1 Madison Avenue.

WALDO BROTHERS, agents for the Perth Amboy Terra-Cotta Company, will furnish the terra-cotta for St. Margaret's Church, Dorchester, Mass.

EXCELSIOR terra-cotta will be used in the new apartment at Roxbury, Mass., W. C. Collett, architect; contract by Charles Bacon, Boston representative.

INCREASED business has made it necessary for the Brick, Terra-Cotta, and Supply Company, of Corning, N. Y., to add to its plant a new muffled kiln and a terra-cotta drier.

JOHN H. BLACK, Buffalo representative for the Akron Hydraulic Press Brick Company, will supply their impervious red front brick for the new public school, No. 19, at Buffalo, R. A. Wallace, architect.

STORE BUILDING FOR JOSEPH HORNE & CO., PITTSBURGH, PA.
Peabody & Stearns, Architects.

THE BRICK, TERRA-COTTA, AND SUPPLY COMPANY, of Corning, N. Y., will hereafter be represented as sales agent in New York City by Mr. E. H. Thomas, of 874 Broadway.

TIFFANY white enameled brick will be used in the new public schoolhouse, No. 16, at Buffalo, F. C. Mohr, architect; also for the

new No. 19 schoolhouse, same city, R. A. Wallace, architect. These orders were placed through John H. Black, Buffalo representative.

WALDO BROTHERS have the contracts for Atlas cement for Hotel Bellevue, Boston, Peabody & Stearns, architects; new building, South and Essex Streets, Boston, Winslow, Wetherell & Bigelow, architects; Spot Pond Pumping Station, Melrose, Mass., Shepley, Rutan & Coolidge, architects.

THE CLEVELAND CAR COMPANY is required by increased business to add considerably to its plant. The company makes cars for hauling clay from the pit, and their increasing business would indicate a returning prosperity to the clay workers, and logically a revival of building operations.

THE ST. LOUIS TERRA-COTTA COMPANY will supply the architectural terra-cotta on the following new contracts: C. R. I. and P. depot at Council Bluffs, Ia.; Glovur Building, Joplin, Mo., Leon A. Hunter, architect; M. E. Church, Vicksburg, Miss., W. A. Cann, St. Louis, architect.

THE REESE-HAMMOND FIRE-BRICK COMPANY, Bolivar, Pa., is running its four plants to their full capacity, and is doubling the capacity of its No. 4 plant by putting in new machinery, erecting a new drier and other buildings, adding twelve new kilns, and expect in sixty days to have the capacity of the No. 4 plant up to 75,000 brick per day.

CHARLES BACON, Boston agent for Sayre & Fisher Company, has closed the following new contracts for brick: Mercantile Building, Congress Street, Boston, Wheelwright & Haven, architects; houses, Beaconsfield Terrace, Brookline, Mass., S. Butterworth, architect; building for Edison Electric Light Company, Boston, Winslow, Wetherell & Bigelow, architects.

BRICK-BUILT cities suffering from the "smoke nuisance" are finding relief from the results thereof in treating the injured walls with Cabot's Brick Preservative, which renews the color, and at the same time waterproofs the bricks, so that the soot does not collect nearly as rapidly as on untreated bricks when water-soaked. The preservative is made in red and cream. Pittsburgh is beginning to revel in it.

THE AMERICAN MASON SAFETY TREAD COMPANY has, during the past month, removed to its new factory in Lowell, a three-story building, 60 by 150 ft., with all modern conveniences. The increasing business of the company has rendered this large increase of floor space necessary, as well as the addition of several machines of special construction for various processes in the manufacture. The number of new buildings in which the Mason Tread has been specified by architects insures an active season for the company.

CHAMBERS BROTHERS COMPANY, Philadelphia, will ship this month to Porto Rico a complete outfit of brick-making machinery for the manufacture of ordinary building and hollow brick. The plant will have a capacity of over forty thousand brick per day, and makes one of several manufacturing enterprises to be conducted by a large company of Philadelphia capitalists that has obtained some valuable franchises in the city of Ponce. Mr. Frank B. McAvoy, a well-known brick manufacturer of Philadelphia, is interested, and will give general direction to the brick-making end of it.

THE CELADON TERRA-COTTA COMPANY, LTD., have closed the following contracts for their roofing tile: Episcopal Church, La Crosse, Wis., Detweiler & Resticeux, architects, Columbus, Ohio; First Presbyterian Church, Fort Smith, Ark., H. I. Goddard, architect; foundry, Moline Plow Company, Moline, Ill., W. L. Paul, architect; United States Mint Building, Denver, Col., James K. Taylor, architect; Roman Catholic Church, Our Lady of Sorrows, Chicago, John F.

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Pope, architect; gardener's cottage and stable, Witherell estate, at Bell Haven, N. C. Mellen, architect; Revere Beach Police Station, Revere, Mass., Stickney & Austin, architects; residence at Westwood, Mass., George T. Tilden, architect; the two latter through the office of Charles Bacon, Boston agent.

THE ATLANTIC TERRA-COTTA COMPANY is now supplying the architectural terra-cotta for the following buildings: School building for the Church of the Immaculate Conception at Montclair, N. J., Schickel & Ditmar, architects; Pawcatuck School, Wilson Potter, architect; Young Men's Christian Association Building, for Williamstown College, George T. Tilden, architect; apartment house, 142d Street and Hamilton Avenue, New York City, Neville & Bagge, architects; residence, 723–5 Fifth Avenue, New York City, Clinton & Russell, architects; apartment house, 105th Street and West End Avenue, New York City, Janes & Leo, architects; Training School for Nurses, Waltham, Mass., T. M. Clark, architect; office building, Broadway and Warren Street, New York City, John B. Snook & Sons, architects.

MERCHANT & CO., INC., of Philadelphia, New York, and Chicago, have recently received an order from the War Department for 786 of their Galvanized "Star" Ventilators, for use on the officers' quarters and barracks to be erected at Havana and Matanzas, Cuba. There will be 587 "Star" ventilators, 24 ins. diameter, and 199 14 ins. diameter. Great promptness is necessary in the delivery of these "Star" ventilators, which the exceptional facilities of Merchant & Co., Inc., will enable them to accomplish.

Some idea of the size of the order can be had when it is stated that if these ventilators were placed in a line, with their edges touching, they would cover a distance of nearly half a mile.

Within the last few months Merchant & Co., Inc., have also supplied 500 18 in. ventilators for the new government hospitals at Fortress Monroe and Savannah.

THE TIFFANY ENAMELED BRICK COMPANY has closed the following contracts to furnish their enameled brick: State Mutual Building, Worcester, Mass., Fuller, Delano & Frost, architects; Pennsylvania Telephone Company's Building, Harrisburg, Pa., D. R. Miller & Co., architects; Twenty-second Ward School, Pittsburgh, Pa., E. J. Carlisle & Co., architects; Schoolhouse No. 9, Buffalo, N. Y., Swan & Faulkener, architects; Century Club, Elkhart, Ind., Wing & Mahurin, architects; Illinois Asylum for Incurables, Peoria, Ill., Reeves & Baillie, architects; for their green dull finish 9 by 3 in. tile at Portland, Ore.

Their English size bricks enameled on the flat side, to be furnished on most of the above contracts, are especially suitable for wainscoting in schoolhouses, public buildings, fine stables, swimming tanks. They have 50 per cent. more enameled surface than the ordinary English size brick, and can be made either 2 ins. or 3 ins. in depth, as desired, with anchor holes, so as to bind them firmly in the wall.

They have recently gotten out some new shades in cream and buff, dull and bright finish, the dull finish being especially handsome, having a soft, velvety appearance.

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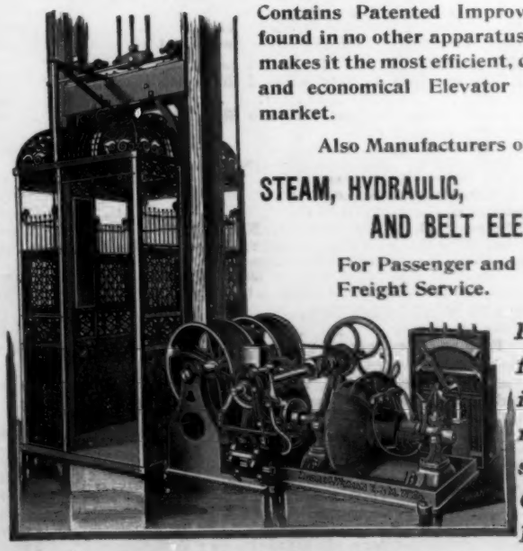

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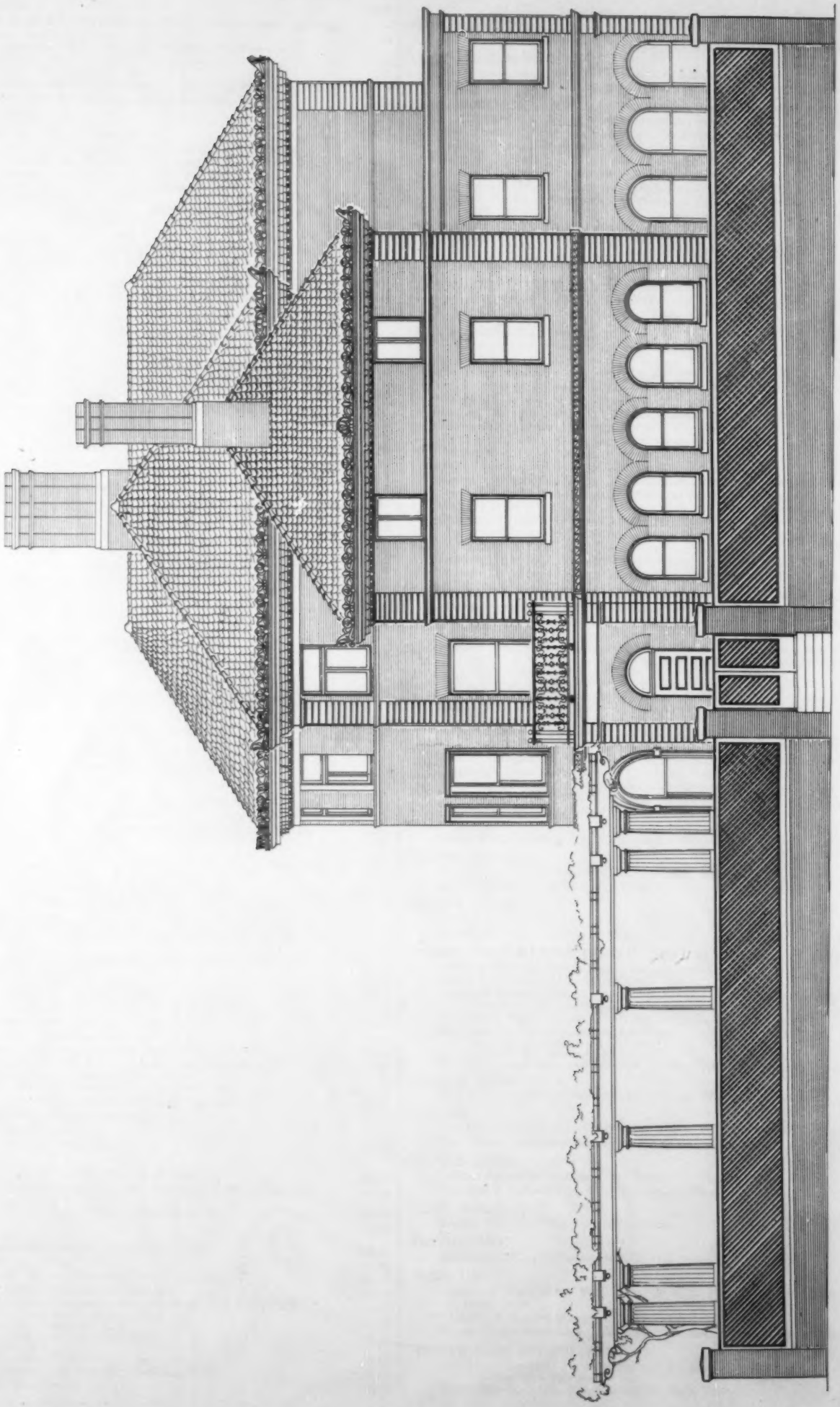
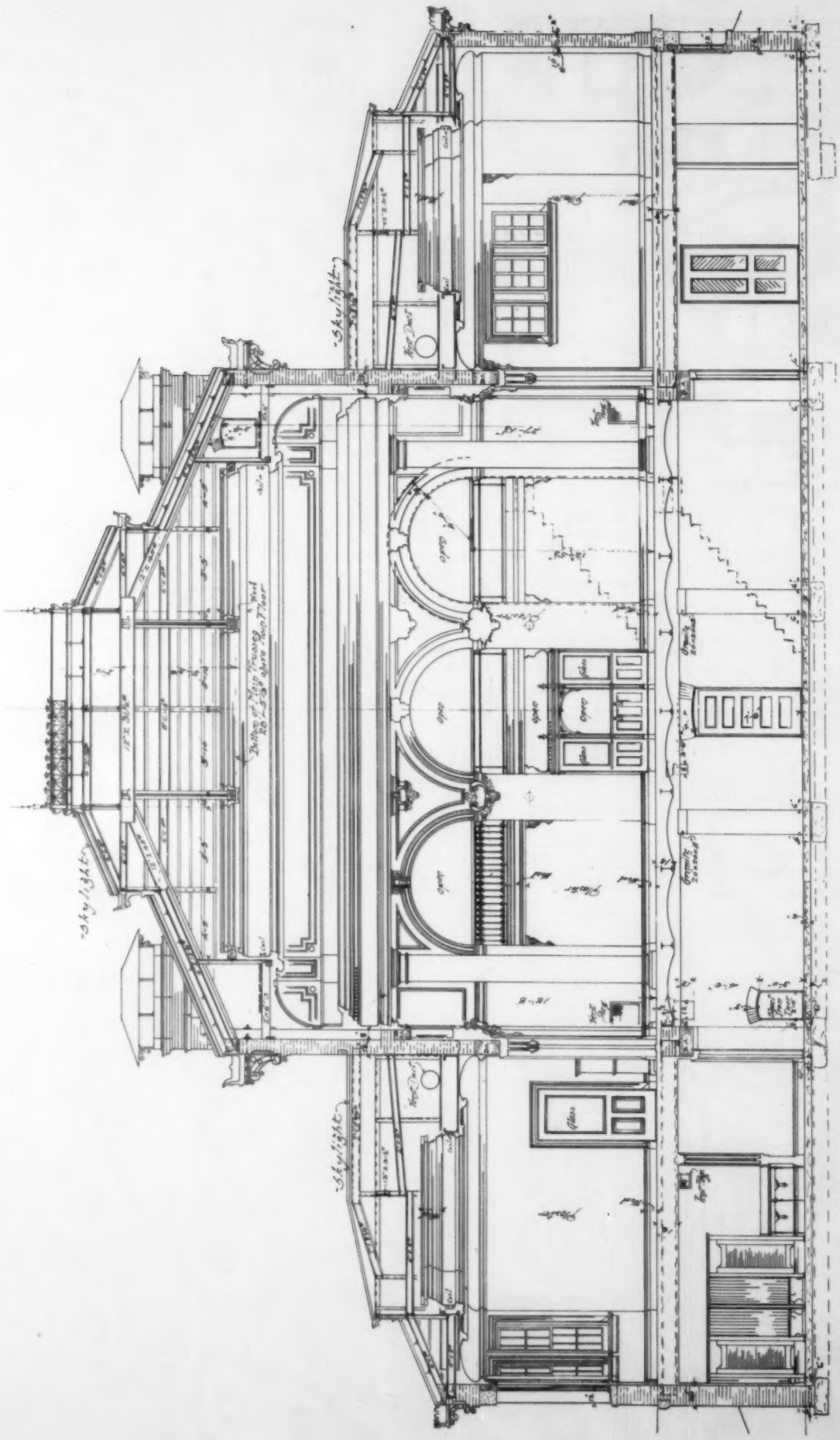


EAST ELEVATION.

HOUSE AT BROOKLYN, N. Y.

BABB, COOK & WILLARD, ARCHITECTS.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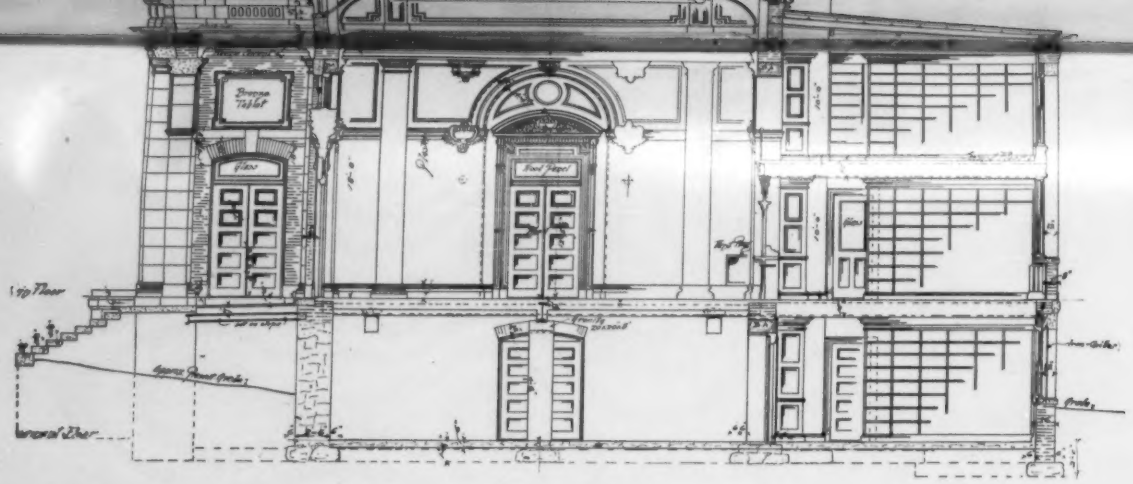

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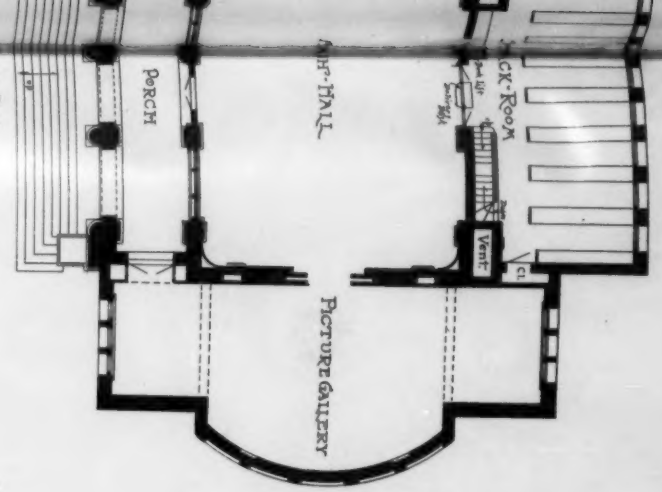

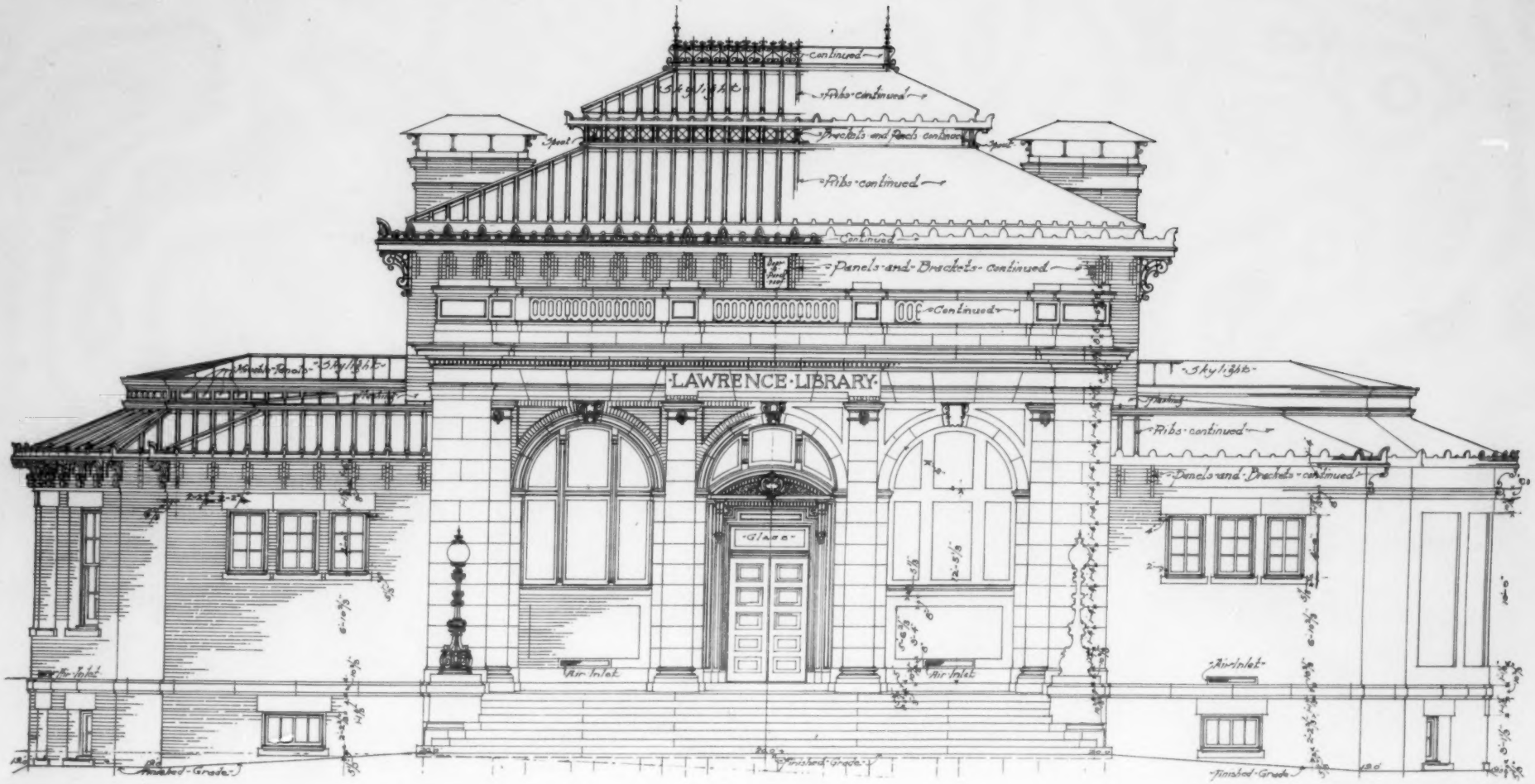

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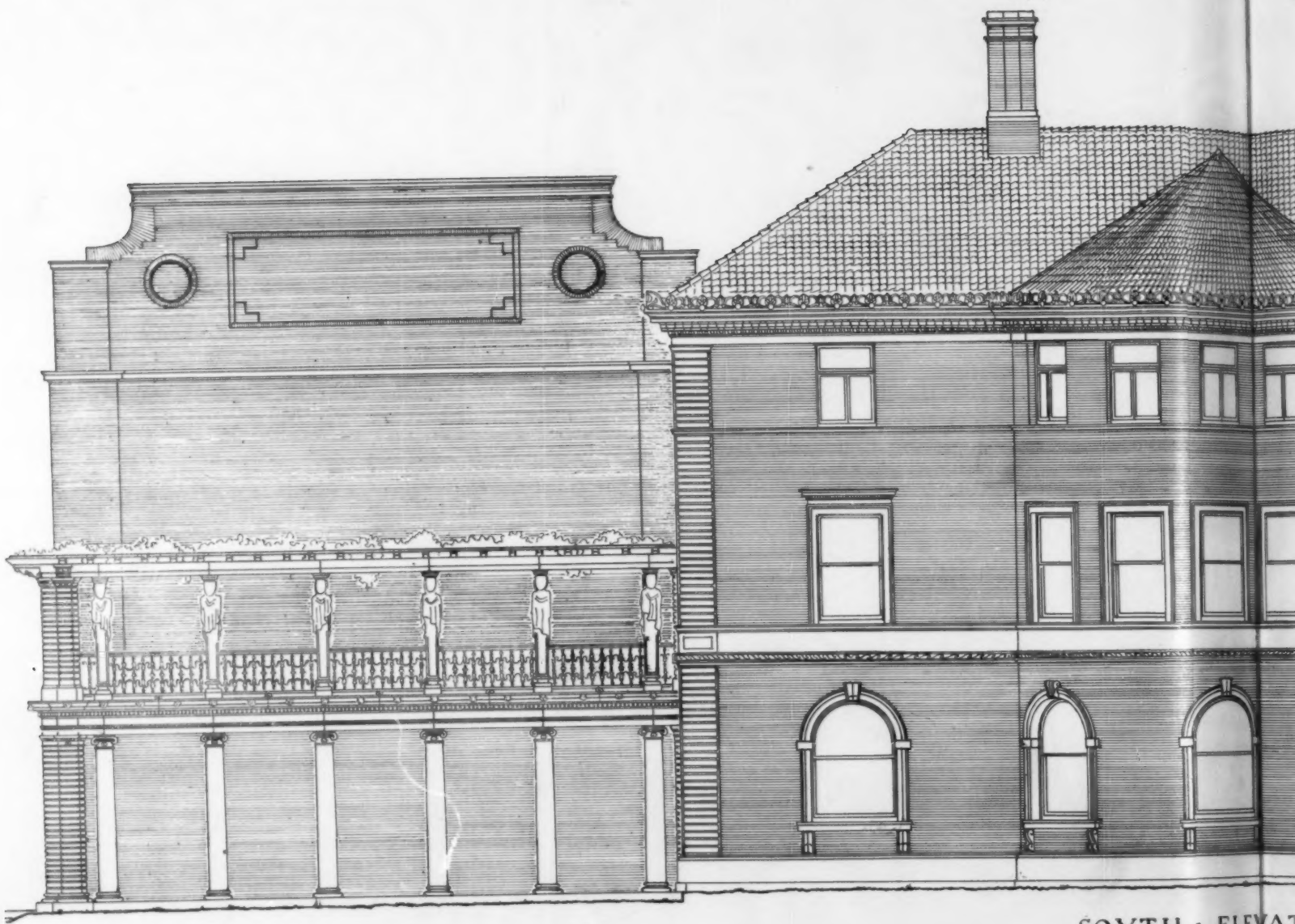
ERNEST FLAGG AND W. B. CHAMBERS, ARCHITECTS.



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BABB, COOK & WILLARD,

PLATES 27 and 30.

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T BROOKLYN, N. Y.

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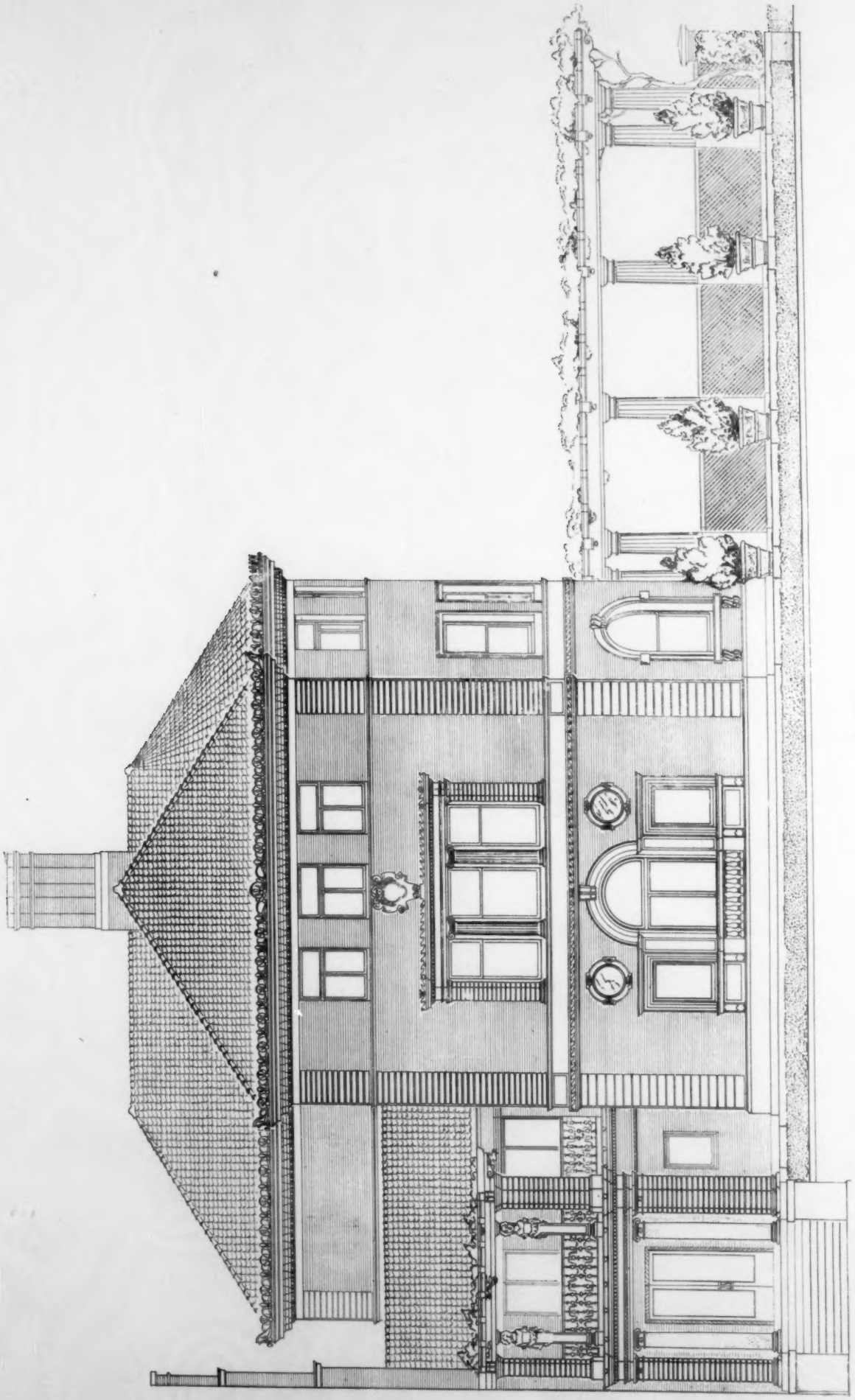

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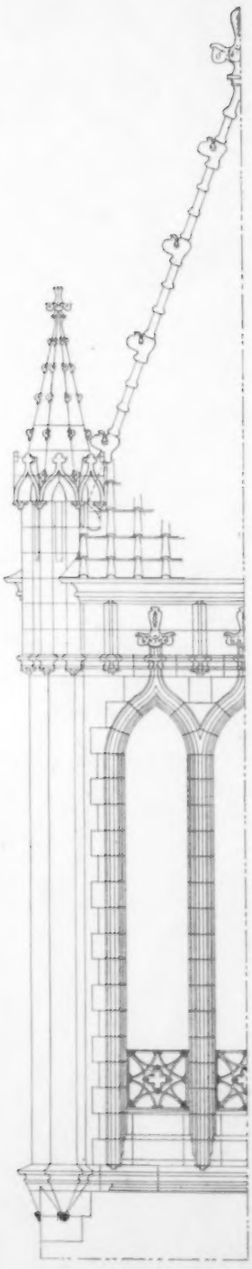

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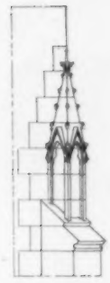
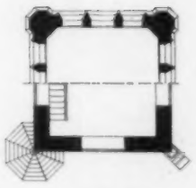
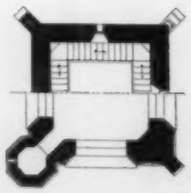


ELEVATION OF PINNACLE TO BUTTRESS



HALF PLANS



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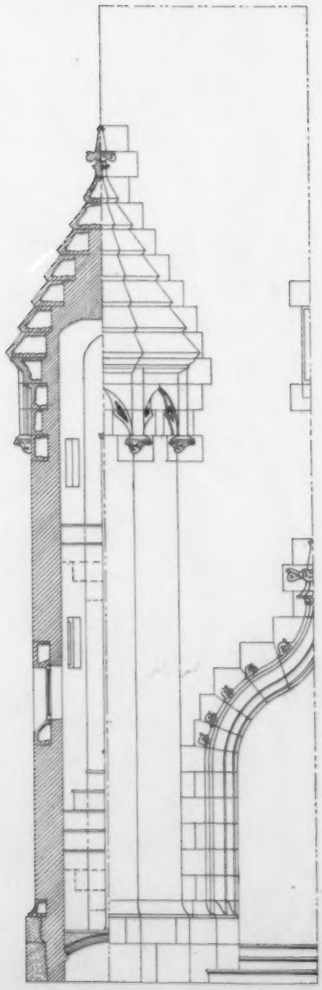
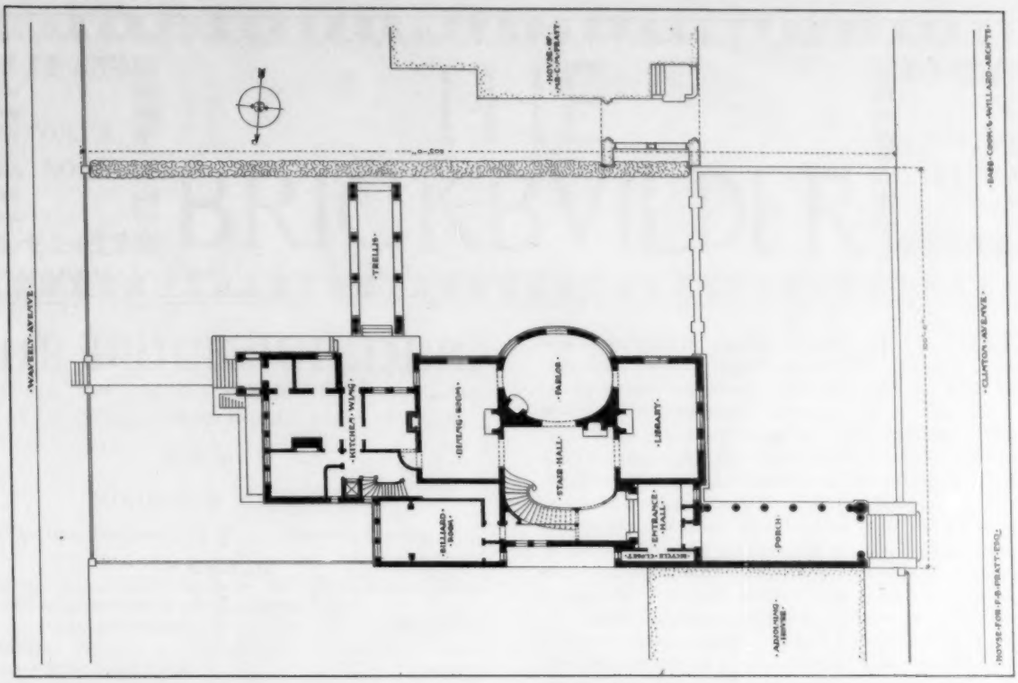


SECTION OF STAIR-WAY IN TURRET.

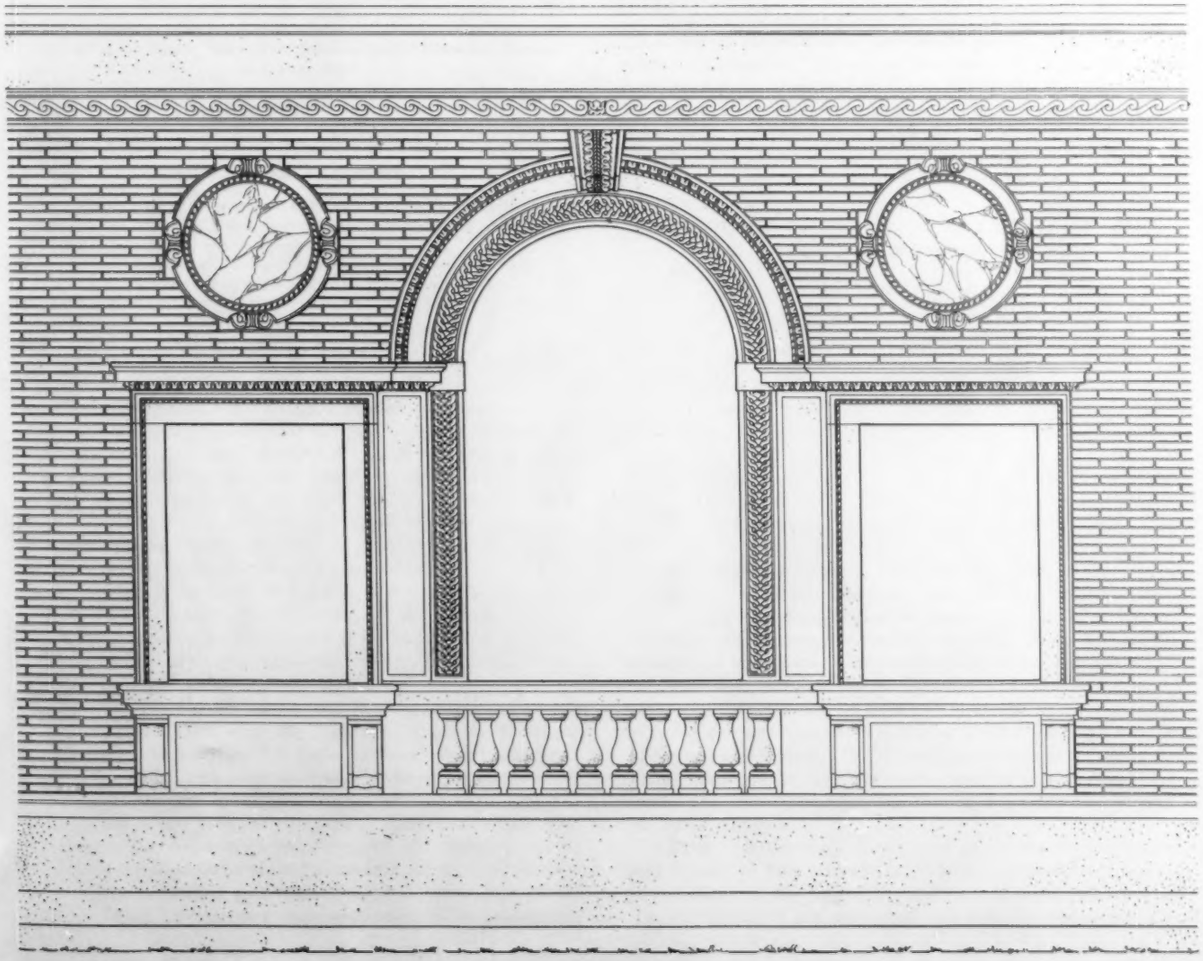
HALF ELEVATION

A MEMORIAL CAMPANILE.
IOWA STATE AGRICULTURAL COLLEGE.

GEO. E. HALLETT. ARCHITECT.
DES MOINES IA.



PLAN.



DETAIL, FIRST-STORY WINDOW, WEST FRONT.

HOUSE AT BROOKLYN, N. Y.

BABB, COOK & WILLARD, ARCHITECTS.